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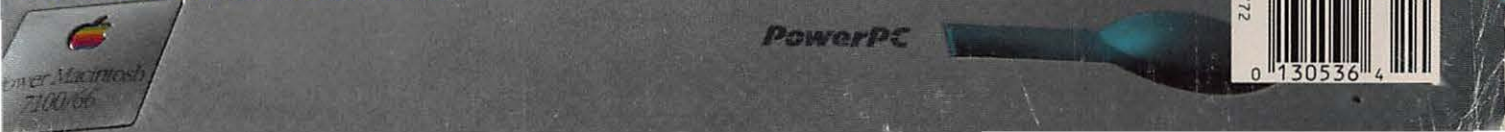
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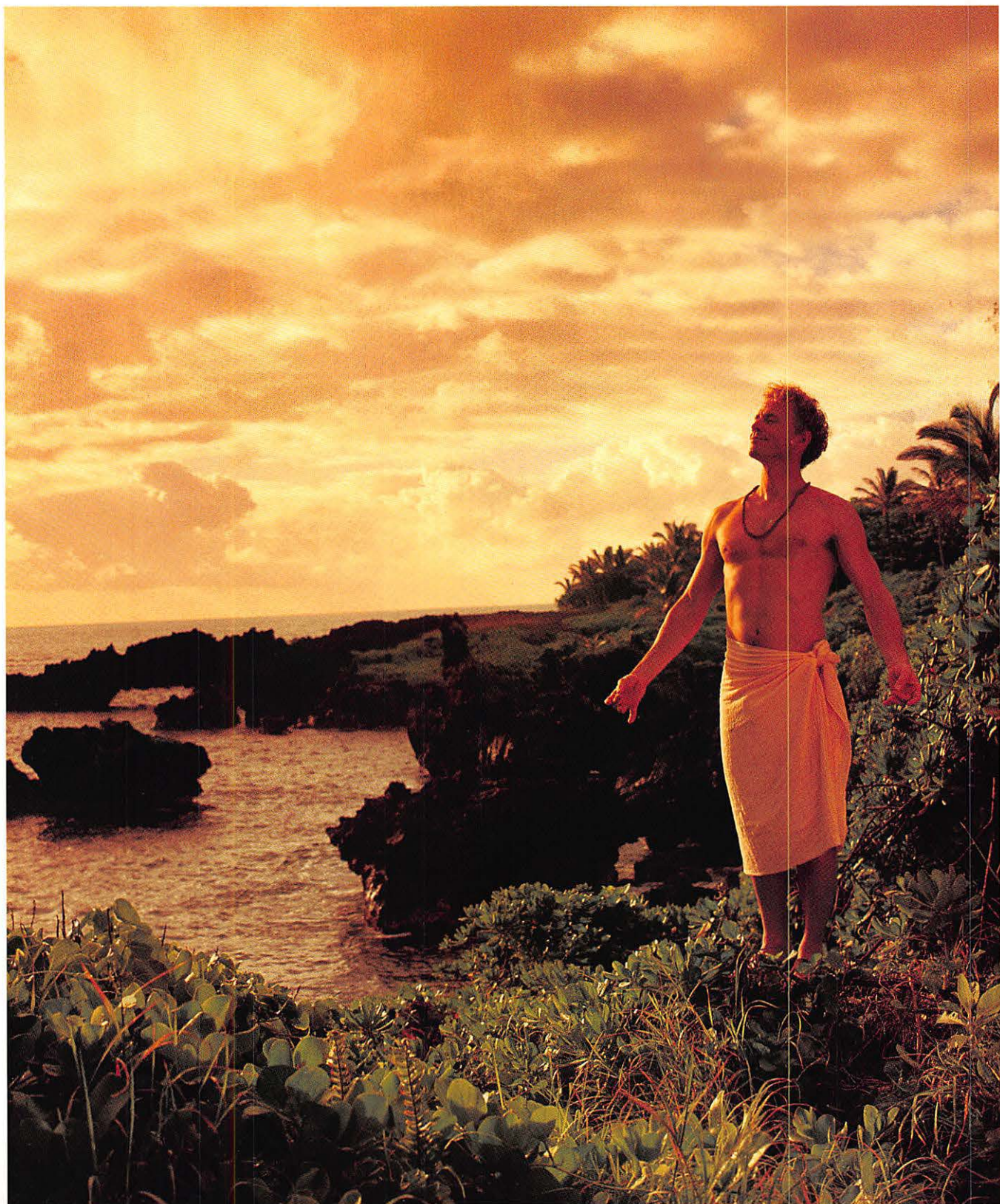
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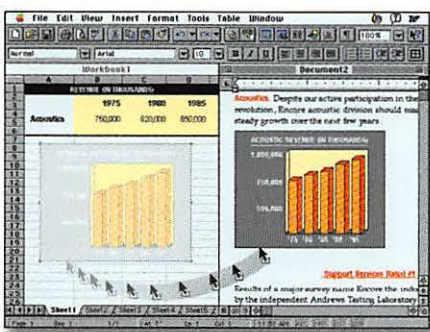
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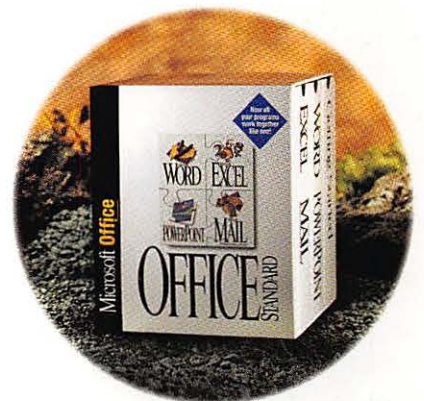
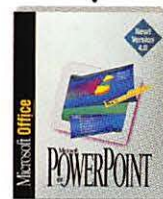
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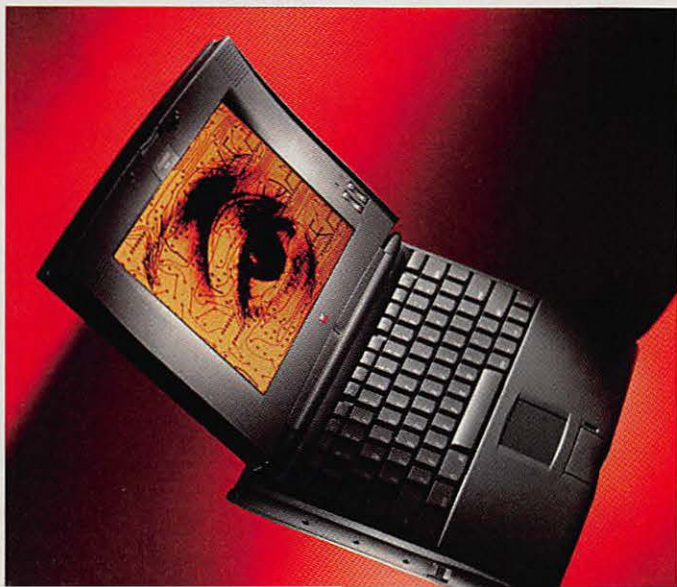
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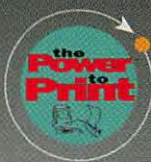
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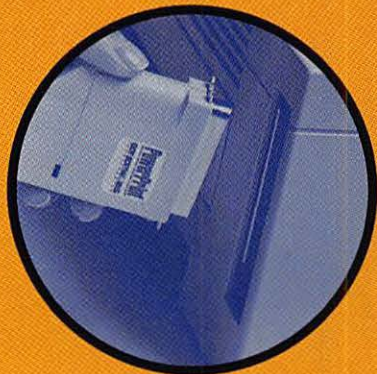
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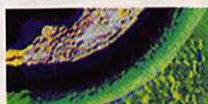
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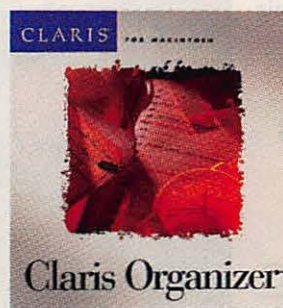
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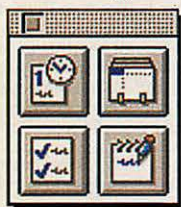
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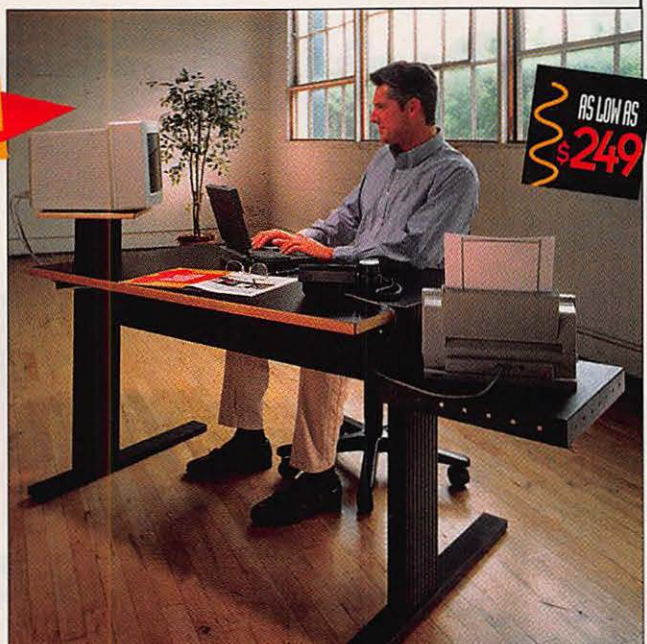
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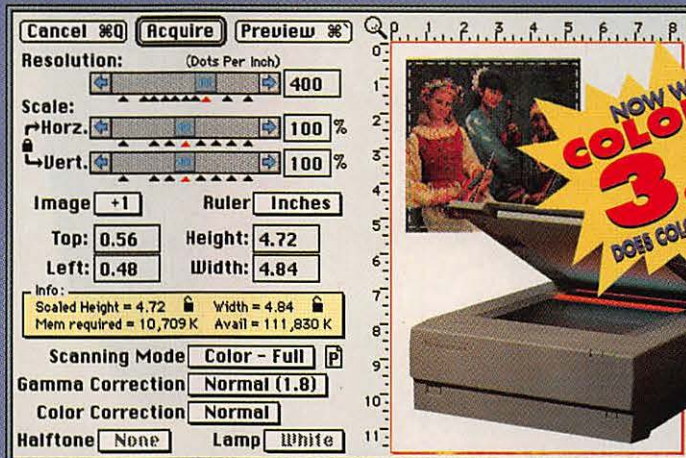
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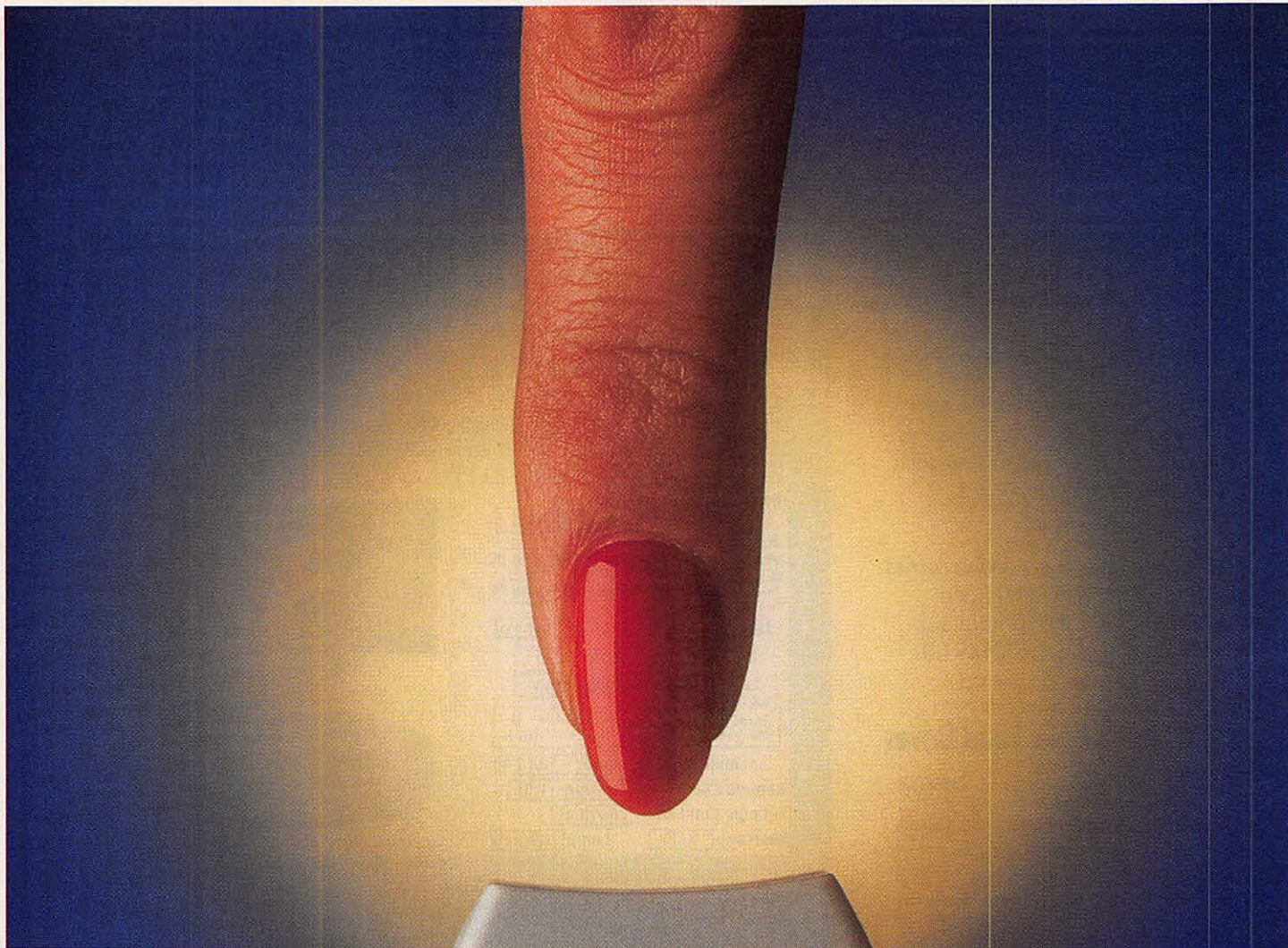
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Juggling Operating Systems

Will you work with multiple operating systems?

THE MOST COMMON DEBATE among personal computer users centers around which is the best computer—a Mac, a PC, or a workstation. The debate usually assumes that the relative merits of a computing platform's hardware isn't fundamentally as important as its operating system. It is the OS—DOS, Windows, Macintosh, OS/2, Unix, and so on—that circumscribes the galaxy of activities associated with a specific computing platform and determines users' loyalty to one type of computer over another.

Even so, some people now talk about the future of OS's and about the OS's association with different types of computers as if they were about to go to a buffet: "I'll be able to do my desktop publishing under the Mac OS, run my company database in Windows, and switch to Unix for the specialized engineering package." From this perspective, users will be able to choose among OS's at will, unhindered by the limited choices each system offers.

Major developers like IBM and, to a lesser extent, Apple have raised the possibility of mix-and-match OS's. IBM is developing Workplace OS for its forthcoming PowerPC computers, and Apple is involved with Taligent, the OS project once code-named Pink. But I doubt that this scenario will happen for a few years, and perhaps not even that soon. Most users won't have cause to switch between OS's and will habituate a single OS. I also suspect that, despite a range of choices, a single OS will still largely be associated with a given platform. So why worry about it? Because this whole topic of running multiple OS's on a single hardware platform is causing a lot of confusion among users and developers, with many people believing in possibilities that appear problematic at best.

Changing Behavior

Why would anyone want to run more than one OS simultaneously on the same computer? The main reason would be to take advantage of each platform's unique

capabilities. For example, an in-house designer in the marketing department might work in the Mac environment to take advantage of its superior graphics and prepress capabilities but switch to Windows to update the custom database application that serves as the company's accounting system. (For more detail on running Windows applications on a Mac, read our cover story this month.)

At first glance, this sounds pretty compelling. After all, most of us don't object to having more choices and fewer restrictions. But I doubt that it will be practical to switch OS's, or that most Macintosh users will even be inclined to do so. Most Mac owners are satisfied with the strong base of software available today. The most common exceptions are people who must use an application man-

Windows you use the left. Imagine having to readjust your behavior constantly for such a basic operation.

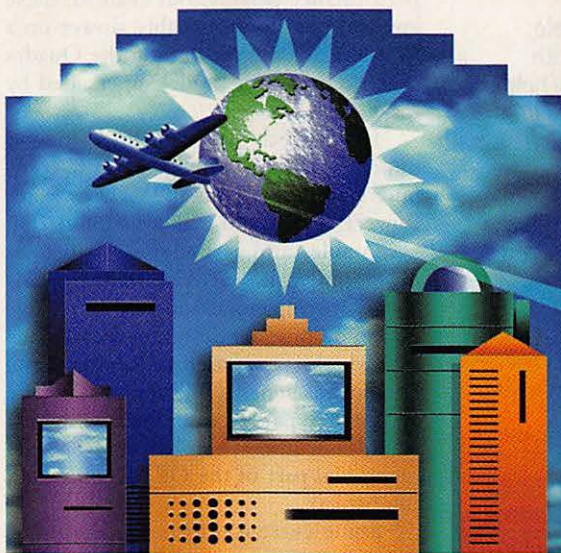
My guess is that people will quickly settle down with one environment and avoid changing to another unless they absolutely have to. The fact is, it's more efficient to stay with a single OS for the same reasons that most of us don't become ambidextrous: habits aren't easy to break, and we avoid learning redundant procedures for accomplishing the same work. In fact, you can see this in today's only real dual-OS environment: few users switch freely between OS/2 and Windows. When they do, it's because they prefer OS/2 but need to use a Windows program for which there is no native OS/2 counterpart. The same would be true for mixed Mac and Windows, or Mac and Taligent, or Mac and Unix. An OS's operations become second nature, and it is irritating to have to continually work against habit.

The Hardware Marriage

Besides the behavioral barriers, several technical issues make it difficult to run multiple OS's. A computer's OS is closely married to the hardware it runs on. The OS must detect and manage numerous hardware configurations—such as memory settings, storage devices, and add-in cards—across a multitude

of special circumstances. Integrating all the options and components in a computer system is not only important to maintaining a functional whole, but it is also a way to add special features. An example of this is the PowerBook Duo's elegant docking solution.

As a hardware platform evolves, it is usually the OS that must knit together the differences between old and new machines, while also evolving to provide new system-level services (such as QuickTime *continues*



dated by the organization or industry for which they work.

Another reason people won't routinely switch between OS's is that it will be disorienting. Users become acclimated to a specific environment and its particular method of operation. Right now, PC users can run both OS/2 and Windows on the same hardware, but many things are different, from mouse operation and icons to menus and shortcuts. In OS/2, for example, you must use the right-hand mouse button to move an object, while in

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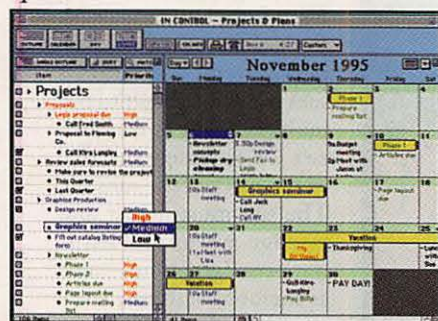
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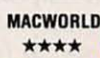
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VR, OLE, and AOCE). While all of this is going on, a system vendor such as Apple or Microsoft must try to maintain as much compatibility as possible between the OS and the existing base of applications software. If incompatibilities and limitations occur when there is a single OS wed to a hardware platform, imagine the challenge of trying to manage all these differences among multiple OS's. Microsoft's Windows NT—a version of Windows that runs on several hardware platforms, not just on Intel 80X86-based PCs—proves this point perfectly. NT has many incompatibilities with nonstandard hardware devices, and even resource-rich Microsoft can't revise NT any faster than about a year after it has revised standard Windows.

Even if these technical challenges could be overcome, there would still likely be a performance penalty somewhere in the system—witness the performance of Windows on a Power Mac. For the Power Mac to achieve any semblance of Windows' speed running on a comparable PC, specialized hardware is required, with significant added cost. Another current example is the slower speed associated with running emulated 680X0 applications on a Power Mac. Apple did a good job of minimizing the performance penalty, but even so, these applications run noticeably slower on a Power Mac than they do on the Quadra 650, the mainstay model superseded by the Power Macs.

IBM, which hopes to run Windows under emulation on its PowerPC computers, is counting on 100MHz or faster PowerPC CPUs to make the emulation acceptable, and is hedging its bet by developing a PowerPC variant that includes on-chip emulation hardware. This is true despite the design of Workplace OS, which is supposed to minimize the emulation penalty by separating the appearance part of the interface (which would run under emulation) from the functional part of the OS (which would run native).

Some current efforts to develop or reengineer OS's are partially focused on making it easier to adapt system software to different hardware platforms. Future iterations of the Mac OS and Taligent, for example, will be object-oriented, which should mean they will be more modular and therefore more easily customized than current OS's. This is what IBM is trying to achieve with its Workplace OS, which will run OS/2, AIX (IBM's Unix), Windows NT, and perhaps System 7 interfaces. The Taligent effort (a joint project of Apple, IBM, and Hewlett-Packard) has switched gears from provid-

ing a new OS to providing an operating environment that would essentially add a software layer to IBM PCs and workstations and to the Mac; this layer would run special collaboration-oriented software and services.

One OS at a Time

As a result of such efforts, it should be easier for software engineers to layer and separate different aspects of the system software, including the user interface, application services, and the management of the computer's hardware. While this approach might help system vendors run versions of their OS's on different hardware platforms, it isn't clear that it will facilitate the simultaneous operation of multiple OS's on the same machine. But even if it does, users still won't like becoming disoriented as they switch between different user interfaces.

Despite the energy being spent by some developers to make computers run several OS's at once, don't expect much to change on your desktop. Perhaps you'll run other OS's occasionally to access programs not available for the Mac, but you're likely to pick one core OS to do your daily work. There's just not much point in continually adapting to different OS's when the one you now use meets most of your needs.

To date, the much-touted information superhighway appears to rest on a foundation of confusion and hype. In "DreamNet," in this issue, Charles Piller outlines the facts and myths behind the information superhighway. An extensive public-opinion survey conducted by *Macworld* reveals some surprising truths about what people really want from the infamous infobahn.

Macworld is no stranger to online publishing. We've enjoyed a presence on America Online for several years and we recently introduced a forum on eWorld. *Macworld* also plans to offer readers access on a number of other services including our own Internet node. In these forays onto the Net, *Macworld* recognizes several key advantages: readers can search electronic archives for topics of interest; engage editors, authors, and other Macintosh users in dialogue; participate in spirited live online events; as well as download shareware files and information that supplements the print version of the magazine.

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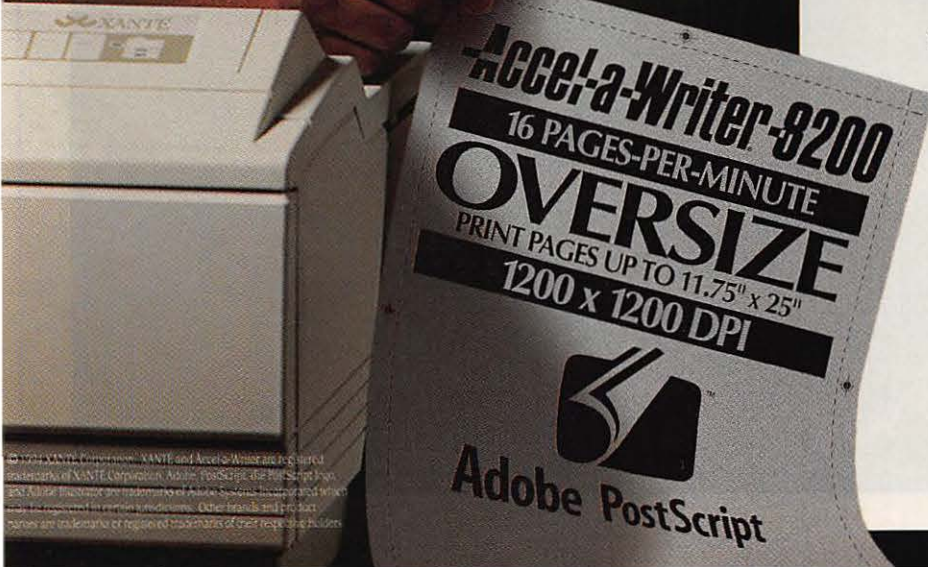
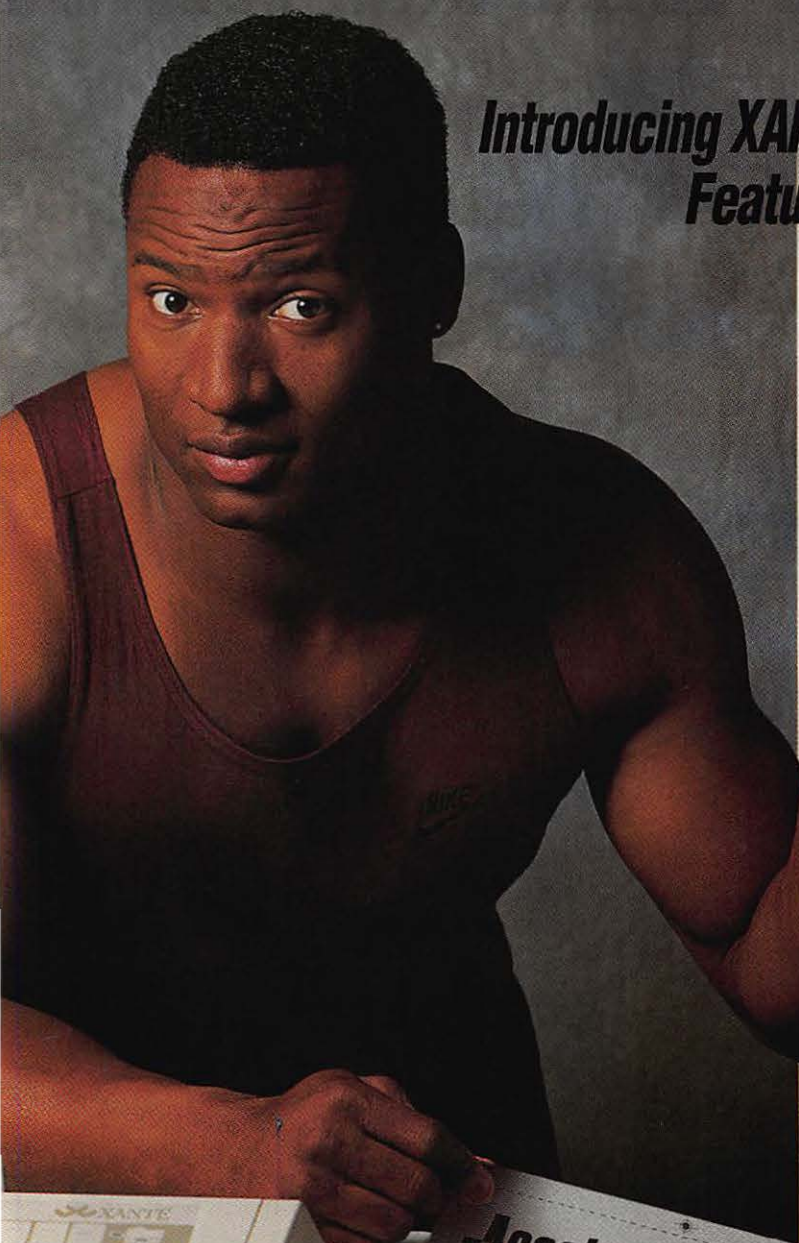
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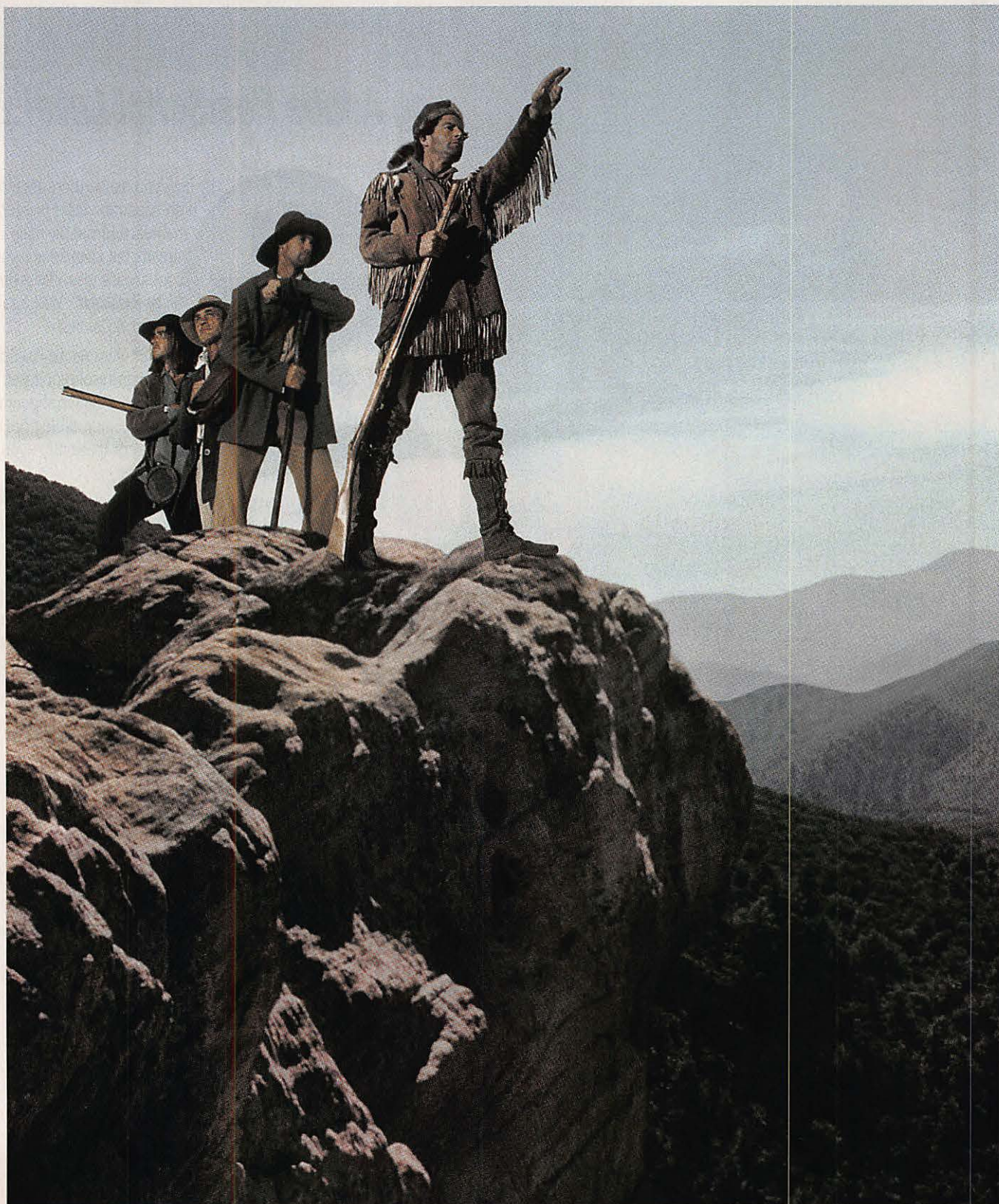
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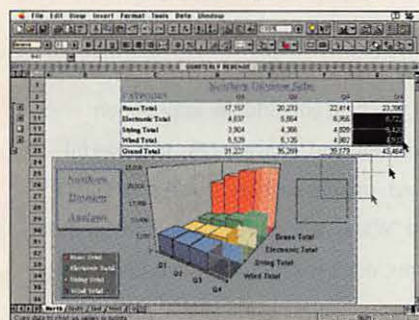
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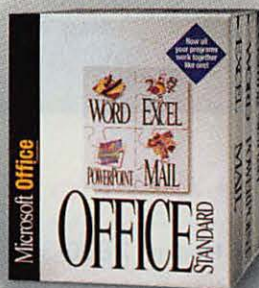
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OCTOBER 1994

Letters

Net Result

STEVEN LEVY'S INSIGHTFUL CELEBRATION of network culture (*The Iconoclast*, July 1994) contains some interesting insights and a big blind spot. His wonderful metaphor "the urbanization of cyberspace" aptly describes the phenomenal explosion of Net activity. Cities have always been communication centers, and the Internet is like a system of cities, each of which is an autonomous network of machines controlled by both affiliated and unaffiliated individuals.

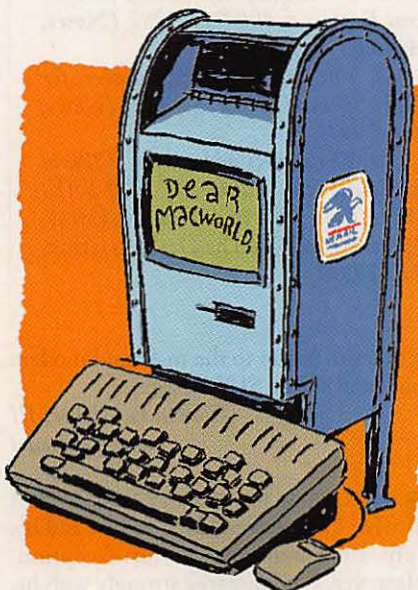
But it is hard to accept Levy's assertion that he "can't really think of an antecedent for the Net." Earth to Levy: the Net is as old as culture. Unlike traditional cultures, the Net is not a product of a single society; like contemporary culture, it is not a product of any one place. It did not suddenly land in our midst as some alien vehicle for social intercourse, but rather arose from a confluence of information technology and existing patterns of communication.

What amazes me is how Net culture seems to coevolve with technology to adapt to the size and diversity of the whole enterprise, and how it really does regulate itself without command and control. But what it's doing isn't new; human and other animal societies have developed this way for millennia.

We have met the Net, and it is us, along with others less like us. Whatever our differences may be, we Netropolitans are evolving a culture together.

*Geoffrey Dutton
Watertown, Massachusetts*

READING STEVEN LEVY'S COLUMN in the July issue, I thought again about what privacy means to me in terms of my electronic life. I concluded that I'm more concerned about present and future techno-savvy types (like Michael Milken and Carlos Lehder) hiding behind their anonymity than about the possibility that Big Brother is onto anything I'm doing.



If the NSA people monitor me, they are, frankly, going to be a bit bored.

Another thought: What do most computer users have to say online that is of any interest to those in charge of national security? Let them read what we're saying. At least they will have no excuse for being out of touch!

Thank you for a thought-provoking article.

*Robert Whitman
via America Online*

Learning to Fly

KUDOS TO GUY KAWASAKI FOR TELLING it like it is in his July column, "Potholes along the Information Superhighway" (*Wise Guy*). While having good typographical sense and being able to convey ideas eloquently in text is elemental to creating multimedia kiosks and CD-ROM projects, many developers miss the point: multimedia is a different paradigm. Developers need to take a closer look at the ways that they can use a graphical user interface in a multimedia environment. Big blocks of text can be horrendously difficult to digest, as anyone

who has used a multimedia encyclopedia on disc will attest.

Guy declares that there is very little available that is worth buying. True, but let us not decry the medium because of bad marketing or bad development thus far. Much like the first movie directors and television producers, multimedia developers must learn to crawl before they can fly.

*Peter A. Cohen
Watertown, Massachusetts*

THE IDEA OF CEOS AND GOVERNMENT officials mapping the information highway frightens Guy Kawasaki, and it scares me, too. I would rather the electronic information system evolve like the sidewalks at Carroll College in Waukesha, Wisconsin.

According to legend, Carroll College was built and landscaped without sidewalks. Students crisscrossed the lawns and created pathways along their favorite routes. After two years, the administration ordered sidewalks built following those eroded footpaths.

I hope we can stall the big corporations and the feds for a couple of years so the information superhighway is mapped after the fact, rather than before—in the wrong place with the wrong road signs.

*Jeanne Gomoll
Madison, Wisconsin*

AS YOU MAY HAVE HEARD FROM recent news reports, Virginia Tech (Blacksburg, Virginia) is wired into our local Bell Atlantic group in a project called the Blacksburg Electronic Village. The goal is to unite the town—students, faculty, and all within Ethernet reach—on the now infamous information superhighway. For the most part the project is pretty cool, but I have to admit that for a town of 30,000 people and a downtown area of 16 square blocks it doesn't make much sense. Heck, I can *walk* from one end of town to the other in less time than *continues*

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LETTERS

CORRECTIONS

■ *Advanced Networks and Services'* phone numbers are 914/789-5300 and 800/456-8267 ("How to Ride the Internet" sidebar in "Macworld's Guide to Online Services," August 1994).

■ *NuDesign Engineering's Nu-Design Color Printer* should have received an "acceptable" technical-support rating ("Color Printers for Every Budget," August 1994).

■ *The correct phone number for Federal Express* is 800/947-5287 (News, August 1994).

■ *The correct phone number for Light Software* is 408/253-4277 (News, July 1994).

■ *The correct address for William Modesitt, the author of 800-SAY-WHAT*, is 189 Auoli Dr., Makawao, Maui, HI 96768 (The Desktop Critic, July 1994).

it takes to log in to the in-bound modem pool and start a SLIP session.

Gordon G. Miller, III
via the Internet

■ USUALLY AGREE PRETTY MUCH WITH what Guy Kawasaki has to say, and his July 1994 column was no exception. However, I did disagree strongly with his statement that there are no CD-ROMs worth buying outside of a few cute educational discs. To make this statement is to put down the efforts of countless incredibly talented women and men. Take the game *Myst* as an example. I've known people who've bought computers just to play worse games than that.

Michael Kobler
Monterey, California

Viral Comment

BRUCE SCHNEIER, THE AUTHOR OF your article on computer viruses ("Virus Killers," July 1994), spent quite a bit of time talking about scanning hard disks but very little (none, actually) on scanning floppy disks.

I scan every floppy, but I scan my hard disk only occasionally. All four packages Macworld Lab reviewed would serve my needs, so I would make a decision based almost entirely upon which product scans floppies the fastest.

The rest of the article was thorough and thoughtful, but I'm still no closer to a decision.

Vanna Lehigh
via America Online

A virus software's floppy disk scan speed is roughly proportional to its hard disk scan speed.—Ed.

AFTER READING THE ARTICLE ON antivirus programs, I thought about the people who write viruses. Who are they and why are they so bored? Luckily, I haven't had any problems with these nasties. I would appreciate further information on Mac viruses.

Sabrina Overturf
Savannah, Georgia

Watch our News section for the latest details on newly discovered viruses.—Ed.

Power to the People

I AM GENUINELY SURPRISED BY BRUCE MacLeod's view that only those people who have "real" work to do should have access to the Internet (*Letters*, July 1994). Sounds rather elitist. Yes, we must not let the common Joes have access to all that information—it might give them ideas beyond their station. And I am sorry if these commoners have caused you inconvenience and delays, but isn't that a rather small price to pay for increasing the accessibility of knowledge to the community as a whole and not to just the select few?

R. J. Thorsen
via America Online

Paying for the Revolution

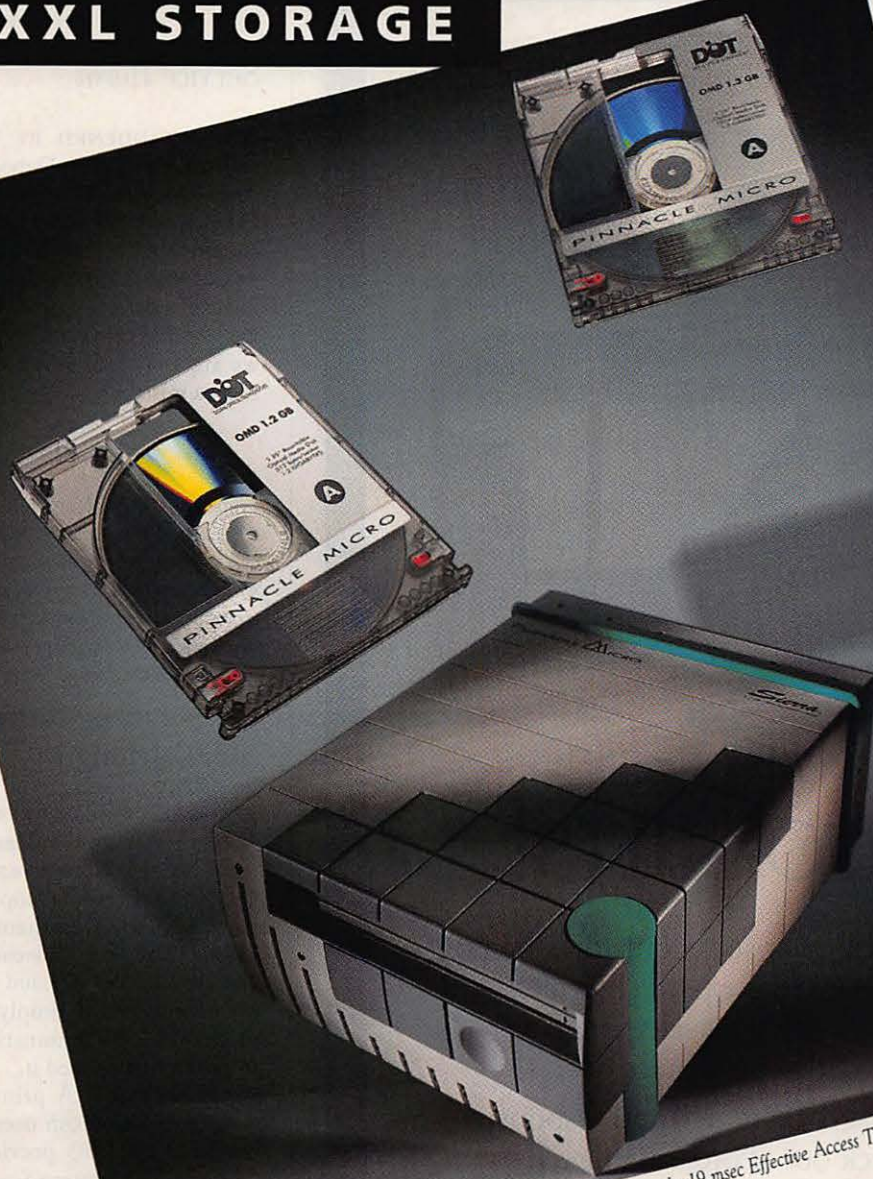
READ STEVEN LEVY'S APRIL COLUMN with great amusement (*The Iconoclast*). It's important to note that Apple's greatest strength—innovation—is also its greatest weakness. Eric Martin and WORM make a number of good points, and I wholeheartedly approve of their efforts to have Apple bundle HyperCard, QuickTime, and especially PC Exchange. But Apple will always have to put up with complaints from customers whose hardware is constantly being surpassed by faster, bigger, more powerful new products. There will always be more forces supporting mediocrity than individuals who recognize ingenuity and support innovation—and are willing to pay for it occasionally.

I'll just have to hang on to my IIsi a little longer and be a little annoyed (and envious) when the other guy with vision gets a Quadra 605 for \$1000. Meanwhile, I'll continue to look to the future, and I hope that Apple will, too.

Steven Vale
Ann Arbor, Michigan

continues

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LETTERS

Service Hero?

I WAS SADDENED BY THE "SERVICE Hero" sidebar in Deborah Branscum's August column (*Conspicuous Consumer*). Why is a company that does what it should be labeled a hero? You wrote, "Our reader was dazzled by the prompt replacement of a defective product." Huh? Have we lowered our standards so much that we are "dazzled" when a company corrects a mistake?

Todd Merrill
via the Internet

Being a Service Hero isn't just about trudging 30 miles through Arctic tundra to tighten a screw. It's also about ordinary companies treating customers honestly and fairly in everyday situations. Replacing a product promptly and with no questions asked might not make for dramatic reading, but it still qualifies as meritorious service.—Ed.


Still Catching Up

IT ORGANIZES DIRECTORIES AND other objects as folders on the desktop," the description reads. It says that "moving objects is as simple as clicking on them and dragging them from place to place." And that "instead of launching your word processor and then opening a document, you'll simply open a document, which will automatically call up the program that created it."

What's this? A primer written for first-time Macintosh users, perhaps? Or maybe it's a 1983 preview of the first Macintosh Operating System? No, these words came from a July 1994 article in a Windows magazine, talking about the beta version of Microsoft Windows 4.0—coming to PC users' screens sometime around the end of this year.

"It'll be great!" my PC friends say about the new Windows OS, which reports say will feature built-in networking, background printing, and plug-and-play. To which I simply smile and reply, "It already is."

Marc Nathanson
Boston, Massachusetts

Letters should be sent to *Letters, Macworld*, 501 Second St., San Francisco, CA 94107; via fax, 415/442-0766; or electronically to CompuServe (70370,702), MCI Mail (294-8078), America Online (Macworld), eWorld (Macworld), Applelink (Macworld1), or via Internet (letters@macworld.com). Include return address and daytime phone number. Due to the high volume of mail received, we can't respond personally to each letter. We reserve the right to edit all letters. All published letters become the property of *Macworld*. 

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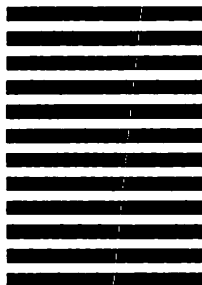
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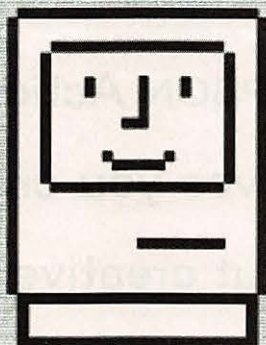
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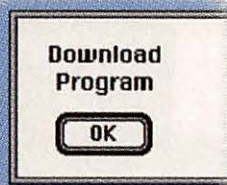
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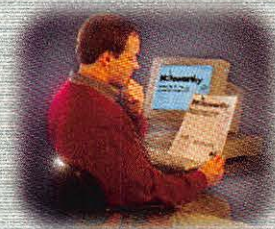
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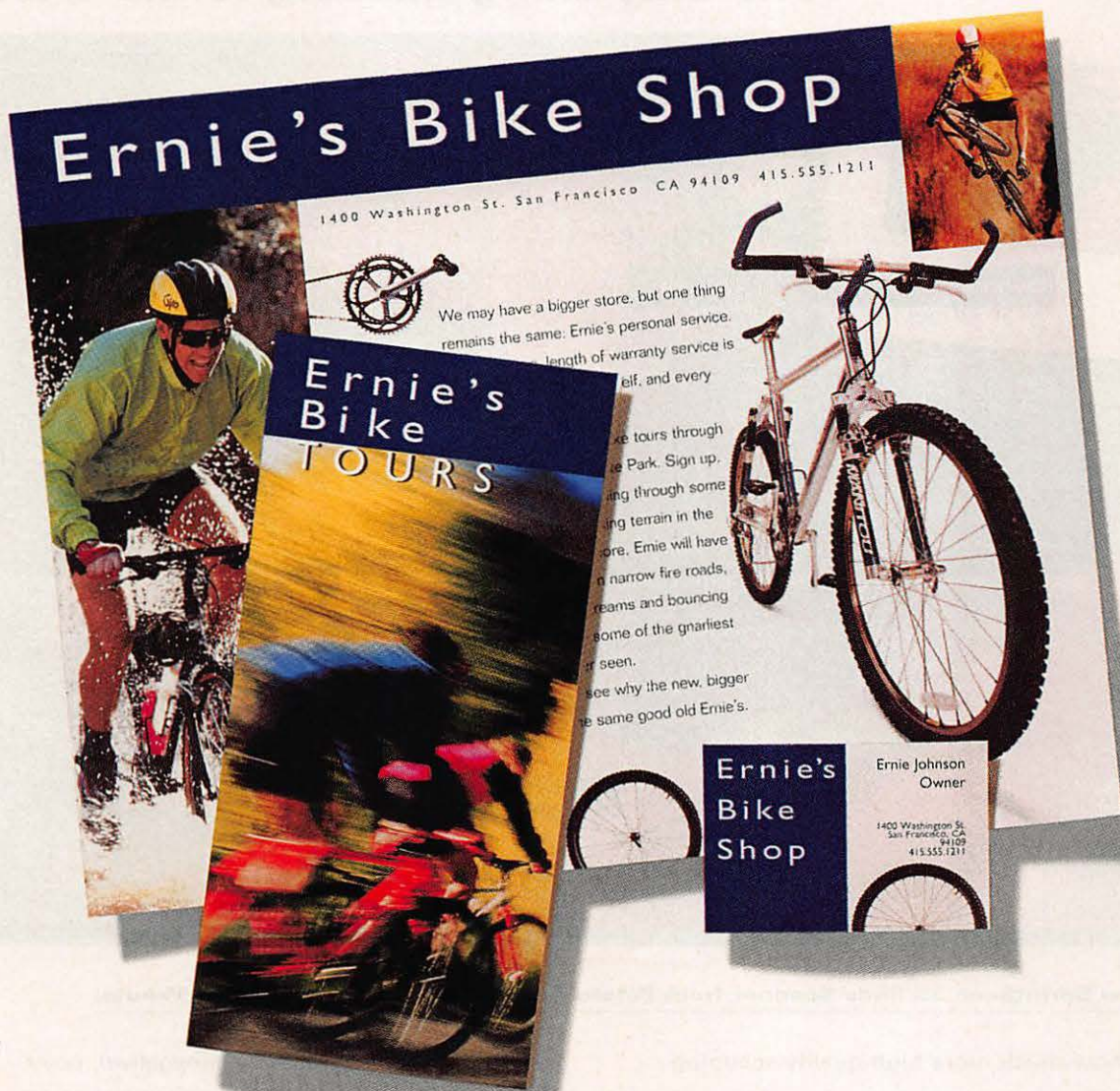
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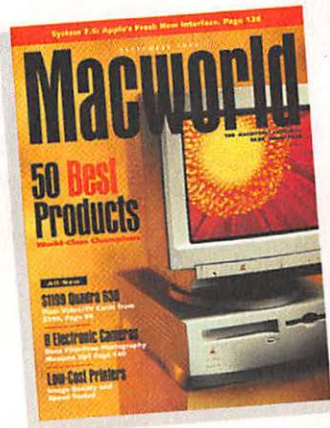
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MacBulletin

Apple Licensing Update Apple president and CEO Michael Spindler reiterated at a recent briefing that Apple will license the Mac OS, although he would not comment on licenses rumored to be in the works with Acer, IBM, and Motorola. Spindler did say that Apple will not license the Macintosh name or industrial design. Apple recently gave the Mac OS its own logo, which Spindler said non-Apple Macs would display at start-up.

Apple Prepares PCI and AV for All The Power Macs expected in spring 1995 will incorporate AV technology, said David Limp, product manager for the new Power Macs, at the August Macworld Expo in Boston. These Power Macs will use the high-speed PCI (Peripheral Component Interconnect) 2.0 bus and will include Apple's DAV (Digital Audio Video) bus. That will permit PCI cards to use both the PCI and DAV buses to move sound and video directly and quickly to the Power Mac's motherboard. Limp said that by 1996 all Macs will use the PCI bus, and by 1997 all Macs, including servers and notebooks, will include some form of AV technology.

Apple Financial Results Up Despite the transition to PowerPC, Apple Computer turned in a solid third quarter, recording revenues of \$2.15 billion, up 15 percent from the same quarter last year. Net quarterly income rose to \$59.5 million from last year's \$10.6 million—not including a revised estimate of the costs of last year's restructuring, which added another \$126.9 million to this quarter's income.

QuarkXPress for Power Mac Ships Quark shipped the eagerly awaited Power Mac version of QuarkXPress 3.3 in early August. The \$995 program is distributed via CD-ROM or floppy disks and includes several utilities and XTensions not bundled for other platforms. Upgrades cost \$195. Quark, 303/894-8888.

ARA Transitional Software Apple Remote Access 1.0 users can now log on to ARA 2.01 servers, thanks to Apple software provided free to user groups and electronic bulletin boards, including eWorld. Once this software is installed on an ARA Personal Server 2.01 or ARA MultiPort Server 2.01 (U.S. version only), the server will accept client calls from ARA 1.0 clients but without the additional security and functions available to ARA 2.01 clients. The software lets users who have a mixture of ARA versions put off the \$29 per user upgrade cost.

Speed Boosters Newer Technology previewed its Power Clip and Mac Clip series of CPU boosters at the Macworld Expo in Boston. Expected to ship August 29, the user-installable clips attach to a motherboard's clock-crystal oscillator (which controls the CPU speed) and make the oscillator and the CPU run faster. Most CPUs can run faster than Apple or the chip maker warrants. Expected to cost between \$200 and \$230, the Power Clip speeds Power Macs by up to 33 percent, while the Mac Clip boosts Quadras by up to 40 percent. Newer Technology, 316/685-4904.

AppleSearch Revised for Internet Version 1.5 of AppleSearch, Apple's text-archiving and -retrieval application, can access information on WAIS servers over the Internet and read their WAIS-format indexes. The AppleSearch server provides the Internet connection for local AppleSearch users; the administrator can designate which WAIS servers users can access. Apple has cut the product's price to \$1799 for the server software and 50 clients.

Radius Acquires VideoFusion With its acquisition of SuperMac Technologies pending, Radius is buying VideoFusion, a digital video-software/special-effects company, in a deal worth \$5 million. **m**

News

EDITED BY TOM MORAN

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QuickTime VR: A New Spin

Imagine that you're in the middle of a room. Now, smoothly look around—left, right, up, and down—at will. If you see something interesting, you can zoom in on it, pick it up, and examine it from all sides, turning it over in your hands. Stop. You've just experienced QuickTime VR.

Coming out of Apple's Advanced Technology Group, QuickTime VR expands the QuickTime data format to include non-time-based spatial information. In English, it's a startlingly realistic way to represent a three-dimensional space or object. Even better, QuickTime VR movies work on LC III-class Macs and can provide views of real environments. This is virtual reality without the helmets and goggles.

VR with the Gloves Off

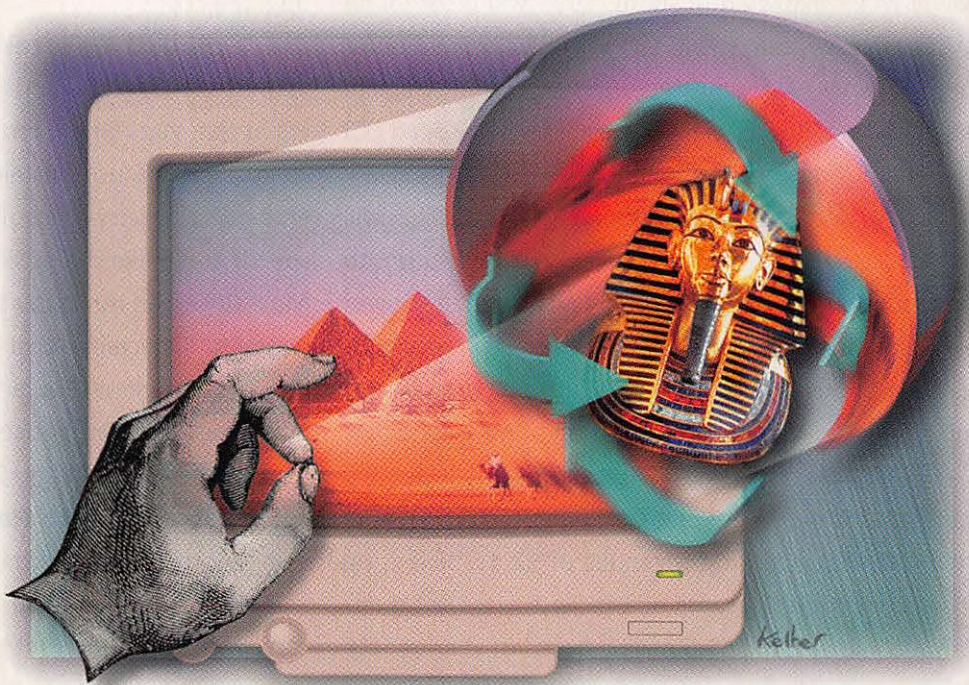
Interacting with a QuickTime VR movie is like looking at a room through a camcorder's viewfinder. Clicking and dragging on the movie display causes your view to pan in that direction, and the speed of the movement is variable and easily controlled. For objects or places of interest in the room,

developers can create "hot spots" in the movie. As you drag across a hot spot, your cursor changes to alert you to its presence, and you can click to zoom in on the object or move into the area. A QuickTime VR movie can just as easily represent an object as a space. In this case, clicking and dragging inside the movie frame causes the object to spin

and tumble so that you can examine it from all sides.

To create a QuickTime VR movie, you first set a camera on a tripod and photograph the space you want represented. Depending on the camera and lens you use, it takes from 8 to 30 photographs to make up a single 360-degree view. After scanning the photos, a developer

uses Apple's QuickTime VR tools to edit and merge the photographs and then turn the result into a movie. (The developer can apply a modified version of this process to rendered environments and objects.) A single panoramic view at 640-by-480-pixel (full-screen) image size with medium-high resolution takes up 800K. Since QuickTime VR is



JOSEPH KELLER/BAD CAT DESIGN, STOCK IMAGES — TSW/H. ARMSTRONG ROBERTS

an extension of the QuickTime architecture, developers can use QuickTime's built-in functionality to juggle resolution, compression, image size, and file size.

VR versus 3-D

The result of these machinations is a little package that neatly solves some of the thorniest problems facing developers trying to realistically render a three-dimensional object or space in real time. As a user moves through a rendered "world," the location of each object must be constantly recalculated, whether or not the user is looking directly at an object. As the number of objects mounts, these calculations rapidly overtake even the most powerful processors, so there's little or no horsepower left over to create the kind of rich, textured environment that arises naturally from a photograph.

According to Eric Chen, inventor of the QuickTime VR technology, playing back a VR movie is a simple matter (to anyone who understands image-interpolation theory) of pushing the user's current view through a spatial-warping algorithm that corrects for the viewer's perspective. All you need for a QuickTime VR experience is an LC III-class Mac or better and QuickTime 2.0 (or a 386SX PC and QuickTime 2.0 for Windows).

Developers of 3-D modeling, rendering, and animation programs retort that it's possible to ease the computational load by precalculating much of a carefully designed world. Also, what QuickTime VR gains in photographic realism, it gives up in freedom of movement, limiting its usefulness. According to Frank Boosman, vice president of product marketing for Virtus VR, "You get semi-interactive 3-D on machines that aren't capable of doing rendering. Forcing users of those machines to move along fixed paths is a reasonable trade-off to make, but rendering scenes in real time is still preferable."

Coming Attractions

Despite its elegant innards, QuickTime VR is a hammer waiting for someone to pick it up and go pound some nails. Apple envisions VR's adoption in several fields: virtual museums, virtual travel for kids and adults, architectural and engineering applications, and of course, entertainment. Simon & Schuster Interactive is champing at the bit with its *Star Trek: The Next Generation Interactive Technical Manual*, scheduled to be available in September. This CD-ROM is a tour of the starship *Enterprise* and its equipment, and it is intended to feel like a reference that *Enterprise* engineer Geordi LaForge would turn to in the 24th century. The disc covers the *Enterprise* both inside and out, and includes tours of the crew's personal quarters, including Captain Picard's. However, at press time Simon & Schuster was the only company with firm plans for the new technology.

Apple nurtured QuickTime VR in near-total secrecy—even top-drawer developers were surprised by the recent announcement. Entertainment and multimedia companies are cautiously optimistic; 3-D developers such as Specular and Ray Dream have responded positively to the idea of saving a three-dimensional model or scene as a VR movie but have indicated that adding such a feature would not be a priority.

As befits the technology, QuickTime is not static. Apple would like to bleed VR movie functions such as interactive hot spots into traditional QuickTime movies, while bringing such time-based data as animation and QuickTime movies into VR spaces. See you in the movies. Apple Computer, 408/996-1010.

—CAMERON CROTTY

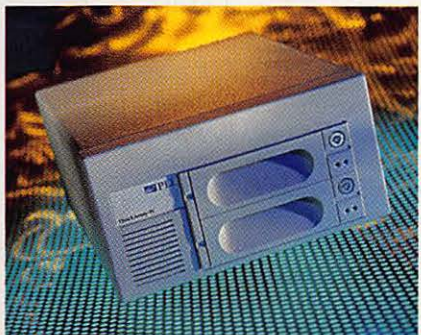
Arrays Built for Speed

RAID LEVELS 0 AND 1

Some people just cannot get enough. Macintosh graphics, prepress, and digital-video professionals whose storage needs aren't met by any one hard drive are turning to RAID levels 0 and 1 disk arrays that write to and read from two drives simultaneously. RAID level 0 arrays spread data across multiple drives, nearly doubling data throughput compared with single mechanisms. RAID level 1 arrays copy data to more than one drive at a time, providing real-time backup.

In digital video, image quality is largely determined by how much data the storage device captures every second. The higher the transfer rate, the better the video image. In response, vendors are offering disk arrays aimed not at networks but at high-end desktop users.

PLI's \$1895 QuickArray-Wide includes a NuBus SCSI controller and everything else you need for a level 0 or 1 ar-



The PLI QuickArray-Wide comes with a NuBus SCSI controller: users add the drive mechanisms.

ray, except the drive mechanisms. You can install any two identical SCSI-1 or SCSI-2 drives in the array's removable drive trays. PLI says the device can sustain data throughput of up to 20 MBps, depending on the speed of the drives.

FWB's monster-capacity 17.4GB SledgeHammer-17400FMF, which is built

continues

In Brief

Focus Buys Inline

Focus Enhancements has bought Inline Software, which sells utilities and games primarily to the Mac market. An Inline official said the company will operate as a separate division of Focus, and will continue to sell all of its current products. Inline had been growing rapidly but was hindered by undercapitalization, according to the company.

Portable CD-ROM Drive

Designed to travel with portable computers, Toshiba's XM-4100A double-speed CD-ROM drive weighs under 1.2 pounds and needs no disc caddy. The drive has a data-transfer rate of 300 KBps and an average access time of 320ms. It supports multisession Photo CD format. Now shipping, the XM-4100A lists for \$415. 714/457-0777.

OpenDoc Alpha on Windows, OS/2

OpenDoc, the document-centered operating environment invented by Apple, has been released in alpha versions for Windows and OS/2 machines. IBM shipped the OS/2 version, while WordPerfect shipped the Windows version. Apple began offering an alpha version of OpenDoc for the Mac in April. When developers finish building OpenDoc application components, the components will work with any of the various versions of OpenDoc (see "Apple Tells Its Software Future," *News, Macworld*, June 1994).

MicroNet Buys MacinStor Line

MicroNet has announced that it intends to acquire Storage Dimensions' MacinStor product line, including all technology and trademarks. MicroNet will continue to sell and support the MacinStor line, while Storage Dimensions says that it will focus on its core client/server networking business. MicroNet, 714/453-6070; Storage Dimensions, 408/954-0710.

around two 9GB Fast SCSI-2 drives, offers a 5ms average seek time with a sustained data-transfer rate of 6.3 MBps. The \$14,199 array connects to the dual SCSI ports of the Quadra 900 and 950 and the Power Mac 8100. A \$14,699 version includes a JackHammer NuBus SCSI controller to connect with other NuBus Macs.

The \$6999 StudioArray from Radius, designed to work with the company's VideoVision Studio digitizing board, is a 4.1GB level 0 array that includes either a NuBus

SCSI card (to connect with the Macintosh Quadra 840AV and the Power Mac 8100) or a PDS SCSI card (to connect with other NuBus 040 Macs). Radius says the array yields a sustained throughput rate of 11.5 MBps with sustained QuickTime reads of 6.5 MBps on an 840AV and 6 MBps on an 8100.

La Cie's Joule RAID, which is available in capacities ranging from 2.1GB to 16.8GB, supports RAID levels 0, 1, 4, and 5. (Levels 4 and 5 add more-elaborate data redundancy and error correc-

tion than levels 0 and 1.) Priced from \$1899 to \$8999, La Cie's arrays connect to the dual SCSI ports of the Quadra 900 and 950 and the Power Mac 8100; a third-party SCSI accelerator card is necessary to connect a Joule RAID with other 040 Macs. PLI, 510/-657-2211; FWB, 415/474-8055; Radius, 408/434-1010; La Cie, 503/520-9000.

—JIM FEELEY

FWB Optical Focus

TWO REMOVABLE DRIVES

FWB has expanded its line of magneto-optical storage devices to include two removable-cartridge drives. The HammerDisk PE230 is a 3.5-inch, 230MB, SCSI-2 drive with a sustained data-transfer rate of 2.1 MBps and an average access time of 43.67ms. The drive is backward-compatible (read and write) with 128MB cartridges, and it lists for \$1399.

The double-sided, 5.25-



FWB's HammerDisk PE230 is an erasable optical drive with removable 230MB cartridges.

inch cartridges of the HammerDisk PE1300 hold up to 1.3GB of data. The drive has a SCSI-2 interface, features a sustained data-transfer rate of 1.4 MBps and an average access time of 55ms, and it can read from and write to existing 600MB and 650MB formats. The PE1300 retails for \$3449. FWB, 415/474-8055.

—CAMERON CROTTY

StuffIt Expander Enhanced

THE LEADER OF THE UNPACK

Aladdin Systems has added the capability to unstuff more kinds of files in version 3.5 of StuffIt Expander, the leading freeware decompression utility. The company has also introduced a shareware program, DropStuff with Expander Enhancer. No, you don't add a pound of hamburger, but when you install both new programs, the new Expander can decompress all leading compression formats for Macs, DOS machines, and Internet files. Supported formats include StuffIt, Compact Pro, AppleLink, ZIP, ARC, gzip, Unix Compress, UUencode, BINHEX, and MacBinary. When used with DropStuff, Expander 3.5 runs up to five times faster on a Power Macintosh, according to Aladdin. StuffIt Expander alone can decompress

StuffIt SpaceSaver files or reconnect files that have been segmented by, for instance, StuffIt Deluxe or other StuffIt programs for storage on a floppy disk. DropStuff, which requires System 7, lets you drag and drop files onto its icon for automatic stuffing. The average gain in space is about 60 percent of a file's original

size when using StuffIt Lite, StuffIt Deluxe, DropStuff, StuffIt Expander with DropStuff, or SpaceSaver.

Public beta testing of the freeware Expander 3.5 and the shareware DropStuff with Expander Enhancer began in mid-June. Both beta versions are now available through online services and from the usual freeware and shareware

BUGS & TURKEYS



Are we the only ones who think it odd that Apple would release software incompatible with its own operating system? Due to a conflict with the PowerTalk extension, At Ease 2.0 won't run under System 7 Pro. No maintenance fix is planned.



Creating temporary suitcases using Symantec's Suitcase 2.1.4 causes a system-error crash on Quadra AV Macs. A patch that updates version 2.1.4 to 2.1.4p1 is available on the major online services or on disk through Symantec's tech support at 503/465-8440.



We're not sure who gets the turkey on this one: Apple, for designing the Centris and Quadra 610 and the Power Mac 6100 with an on/off button directly under the floppy-disk port, or the befuddled PC users who think it's the floppy-eject button and accidentally shut down their Macs.



SimpleText, the TeachText-on-steroids that Apple includes with its System Update 3.0, won't let you undo anything; the Undo item appears in the menu but is always grayed out, and ⌘-Z doesn't work, either. SimpleText also doesn't support the F-keys on Apple's Extended Keyboard—namely, F1 through F4, better known as Undo, Cut, Copy, and Paste. Of course, you can always use the menu or the keyboard equivalents for these (except Undo).



NEC's MultiSpin 3Xe CD-ROM drive doesn't ship with Mac-compatible software drivers; you have to buy the disk separately in a \$31 Mac connection kit. But don't put away your wallet yet. Since the drive uses a PC-style high-density SCSI-2 connector, Macintosh users will also need to buy a Centronics-to-SCSI-2 adapter or cable to connect the 3Xe to other external SCSI devices.

Macworld will send you a Bug Report T-shirt if you are the first to inform us of a serious, reproducible bug that we report in this column, or a Turkey Shoot T-Shirt if we shoot your turkey in this space. See *How to Contact Macworld*.

sources. The final versions of Expander 3.5 and DropStuff were slated to ship in early July. The shareware fee for DropStuff is \$30. Aladdin Systems, 408/761-6200.—T.M.

Mac-less Presentations

SHARP LCD PANEL

Why carry extra equipment to a presentation? Sharp's new QA-1500 color LCD projection panel stores images on an optional PCMCIA card, relieving your PowerBook of slide-projector duties. You plug the QA-1500 into your Macintosh like any other external display device and run your presentation; the panel grabs the frames and stores them. The QA-1500's PCMCIA slot accepts Type III storage cards up to 105MB (roughly 100 images), and you can sort the images on each card into five separate presentations.

Once the images are in the QA-1500, you can reorder them, delete them, and add transitional effects—all without any help from your Mac. On-screen menus guide you through all operations, and you send commands to the panel from an infrared remote control. The remote also con-

trols your presentation and it can learn up to five functions from another infrared remote, so you can command a VCR or other device without juggling two controls. If you decide to connect the QA-1500 to your Macintosh and use it as a traditional projection panel, you can plug it into your Mac's ADB port with an included cable and then use the small joystick on the remote instead of a mouse.

The QA-1500 panel features an 8.4-inch-diagonal active matrix color display that's capable of showing 1.7 million colors at 640-by-480-pixel resolution. Even though it's intended as a stand-alone presentation device, the 13-by-10½-by-2-inch panel includes composite-video inputs (NTSC, PAL, and SECAM), built-in speakers, and line-level audio-input and -output jacks. The panel is currently available for \$5795; an optional PCMCIA storage card is \$500 for 40MB, \$550 for 105MB. An optional backlight that turns the QA-1500 into a stand-alone color monitor is also available for \$395. Sharp Electronics, 201/529-8731.

—CAMERON CROTTY



The PowerCard (top) can link most Macs to PCMCIA products such as Epson's 170MB drive.

KEVIN CANDLAND

SCSI PCMCIA

ADAPTER FOR MOST MACS

The new PowerBook 500 series supports a PCMCIA adapter in one of the battery bays, but now SCSI PCMCIA adapters are appearing that will work with nearly any Mac. Software Architects' PowerCard accepts PCMCIA Type I, II, and III storage cards (including SRAM, flash RAM, and hard disk cards), has a SCSI-2 interface, and is compatible with SCSI Manager 4.3. The device ships with Dayna Communications' DOS Mounter, plus Software Architects' own driver software; the combination makes it possible for users to mount DOS-formatted PCMCIA cards. The PowerCard is currently available for \$495. Software Architects, 206/487-0122.—CAMERON CROTTY

Low-Cost, Large Screens

GALAXY-CLASS MONITORS

Hitachi America has unveiled a pair of high-resolution, multisyncing monitors with lowball prices. The Accuvue Galaxy GX-20 measures 20 inches diagonally and lists for \$1749. The Accuvue

continues

In Brief

SyQuest Settles with Iomega, Nomaï

After a long disagreement over Iomega's marketing of replacement SyQuest cartridges made by Nomaï, the three companies have settled pending litigation out of court. SyQuest said it will receive royalties from the two companies, which will continue to offer 44MB and 88MB cartridges for SyQuest's 5¼-inch drives. Separately, Iomega said it has begun making its own versions of the affected cartridges.

Free Bernoulli Drive with Director 4.0

Iomega and Macromedia have begun bundling the Iomega MacTransportable Bernoulli MultiDisk 150 drive with Macromedia's Director 4.0, at the same street price as Director alone, according to Iomega. Beginning September 1, the \$850 multimedia authoring software will come installed on an included removable cartridge for the drive. The two companies offer an equivalent bundle on the DOS side. Macromedia, 415/252-2118; Iomega, 801/778-1000.

Compton's Encyclopedia, Version 3.0

Compton's NewMedia is bringing out Compton's Interactive Encyclopedia, Version 3.0, with an improved interface and 256-color graphics. The interactive version includes all the same articles as the 26-volume print edition. The Mac version of the new electronic encyclopedia should ship in October at a list price of \$149.95. 619/929-2500.

Less Money for Monitors

ViewSonic has reduced the prices on several of its color Mac monitors. The ViewSonic 15 now retails for \$525, the ViewSonic 17 for \$1045, the ViewSonic 17G for \$945, and the ViewSonic 21 for \$1995. 909/869-7976.

THE AMCOEX INDEX OF USED MAC PRICES

Machine/RAM/Hard Drive	Average Sale Price	Monthly Change
PowerBook 100/4MB/20MB	\$650	-\$25
PowerBook 140/4MB/40MB	\$850	-\$50
PowerBook 180/4MB/80MB	\$1675	-\$25
PowerBook Duo 230/4MB/80MB	\$1100	\$0
Mac Classic/2MB/40MB	\$400	-\$25
Mac SE/30/2MB/40MB	\$600	\$0
Mac LC II/4MB/40MB	\$525	-\$50
Mac IIsi/3MB/40MB	\$500	-\$25
Mac IIfx/4MB/80MB	\$950	+\$50
Mac IIfx/4MB/80MB	\$1025	-\$75
Centris 650/8MB/230MB	\$1275	+\$75
Quadra 900/8MB/160MB	\$2000	-\$100

Index provided by the American Computer Exchange of Atlanta, Georgia (800/786-0717). It reflects sales during the week of July 20. Configurations include keyboard and exclude monitor and display board for noncompact models.

Galaxy GX-21 is a 21-inch display that goes for \$2099. Intended for CAD/CAM, multimedia, desktop publishing, and other applications, both monitors offer resolutions up to 1600 by 1280 pixels at vertical refresh rates ranging from 50Hz to 152Hz (at 1280 by 1024 resolution, the refresh rate is an eye-pleasing 84Hz). The monitors' flat screens have a 0.28-mm dot pitch and an Invar shadow mask rather than the aperture grille found in a Sony Trinitron tube.

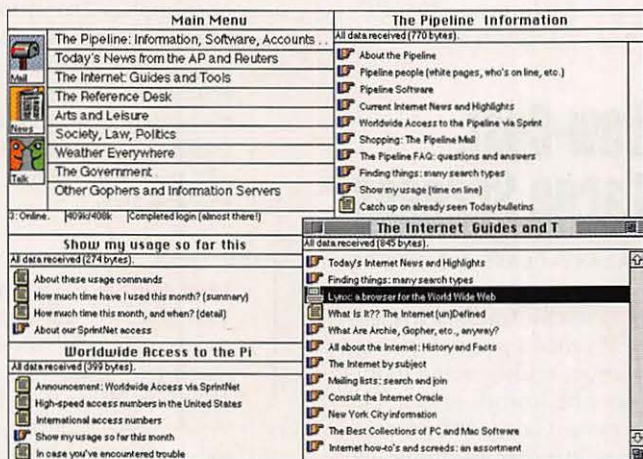
Both models comply with the EPA's Energy Star power-conservation guidelines and the Swedish MPR II standard for magnetic-field emissions. Both Accuvue Galaxy monitors have front-mounted controls. The monitors should be shipping by the time you read this. Hitachi America, 201/573-0774 (East Coast), 510/785-9770 (West Coast).—T.M.

A New Mac Pipeline to the Internet

ORDER OUT OF CHAOS

James Gleick, author of the science best-seller *Chaos*, was frustrated by the inconvenience of most forms of Internet access. Unlike most of us,

he had the resources to do something about it. He hired a programmer, outlined what he wanted in Internet access, and set the programmer to work creating a new type of



Pipeline Internet access software can download a file, execute a Gopher search, and scroll your mail in separate windows at the same time.

TREND

Modem Prices Drop

HIGH SPEED FOR LOW BUDGETS

The cost of high-speed telecommunications just went down: four companies have announced price reductions for their 9600-bps, 14.4-Kbps, 19.2-Kbps, and 28.8-Kbps fax modems.

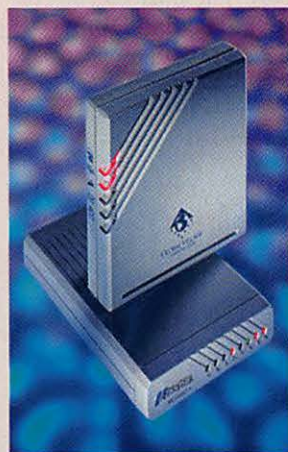
Practical Peripherals reduced the prices of 15 of its fax modems, including three models that come with Mac cables and data/fax communications software. The top-of-the-line, 28.8-Kbps MacClass MC288LCD V.FC model (with a three-line LCD display for status messages) lists for \$429, and the compact, 28.8-Kbps MacClass MC 288MT // V.FC goes for \$299—\$110 less than before. The company's 14.4-Kbps MacClass MC-144MT now goes for \$159.

Global Village Communication's popular TelePort Gold 14.4-Kbps fax modem went down in list price from \$349 to \$279. The compa-

ny's 19.2-Kbps V.32terbo TelePort Mercury fax modem, formerly \$399, now lists for \$349. And its new PowerPort Mercury 19.2-Kbps fax modem for PowerBook 500-series portables goes for \$399. All the models come with GlobalFax software. Buyers of Global Village's high-speed fax modems for portable or desktop Macs also qualify for a \$100 rebate on the company's OneWorld remote-access server. Global Village also plans to introduce competitively priced high-speed fax modems this fall.

Hayes Microcomputer Products lowered the price of five models, including the 14.4-Kbps Accura 144 + Fax144 Mac. It now lists for \$179, down from \$199.

At the same time, U.S. Robotics announced suggested list prices for its Courier family of modems, which support V.32terbo



The Global Village TelePort Gold (top) and Practical Peripherals' MacClass MC144MT //.

19.2-Kbps, V.FC 28.8-Kbps, and the forthcoming ITU-T V.34 28.8-Kbps standard for telecommunications. Prices for the ten external and internal models range from \$435 to \$745.

Global Village Communication, 415/390-8200; Hayes Microcomputer Products, 404/441-1617 (519/746-5000 in Canada); Practical Peripherals, 805/497-4774; U.S. Robotics, 708/982-5010.

—NANCY E. DUNN

service that offers full Internet access (E-mail, FTP, Telnet, WWW, WAIS, Gopher) with a graphical interface. The Macintosh version of the service is now being tested, and it offers unique features and a contrast to national online services.

Unlike America Online and Prodigy, which offer a few Internet functions embedded in a larger world of interest-group bulletin boards and commercial services, Pipeline's only content is Internet-related, ranging from Internet Relay Chat to the ClariNet news services. Pipeline also provides some content itself, with an emphasis on New York places and activities, interactive Internet tutorials, and fairly serious topics (one popular discussion area is called Society, Law, and Poli-

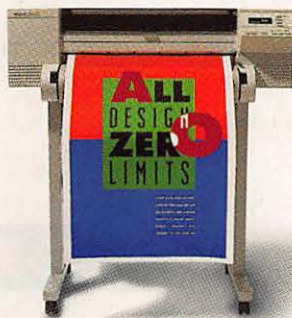
tics). The Pipeline software package is transparently multitasking—multiple communications sessions can take place at the same time in different Pipeline windows. A Gopher search can take place in one window while you read your mail in a second window and download a file in a third, a great improvement over standard Internet access with a terminal program.

At press time, the Macintosh version was at the late beta stage, with the final release expected before October. Pipeline's most popular access plans give you 20 hours of Internet access for \$20 a month or unlimited access for \$35 a month, and non-New Yorkers can reach Pipeline through local SprintNet numbers. Pipeline, 212/267-3636.—CHARLES SEITER

*Suggested U.S. list price. **Larger model lists at \$11,595. †Pantone, Inc.'s check-standard trademark for color. Adobe and PostScript are trademarks of Adobe System Inc. which may be registered in certain jurisdictions. ©1994 Hewlett-Packard Company PE12110

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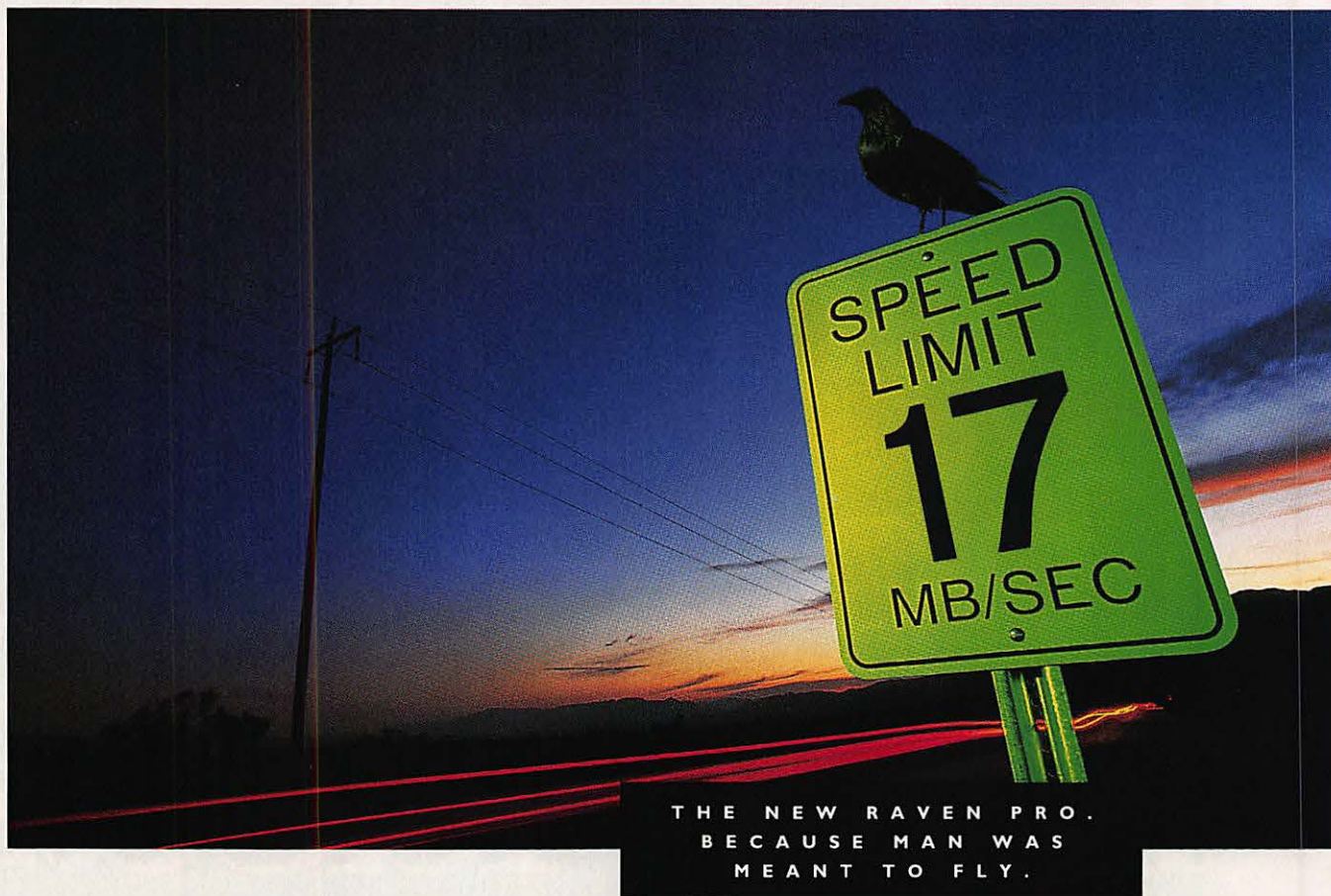
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without losing a single frame. Gain access to mirrored business-critical data in less than 8 ms or mix and match RAID levels and partitions to meet your specific needs. With 17.2 MB/sec throughput and up to 52 GB on-line capacity, they're four times faster and have 104 times the capacity of the native 500 MB



Raven Pro

drive you're probably using now. To find out what Raven Pro can do for your company's throughput, call 1-800-800-DISK. Then let your imagination and productivity take flight.

Raven's flexible utility program allows you to optimize drive caching and each partition's parameters, including location on disk and block size for maximum application performance.

Raven Pro disk arrays offer a flexible upgrade path for all high-powered Macintosh systems via PDS, NuBus or software. PDS and NuBus versions provide a 32-bit data path via Fast/Wide SCSI-2.

MicroNet's Raven Pro is the newest addition to our family of award winning storage solutions. Based on proven Raven technology, it takes the science of disk array engineering to an unprecedented level.



M i c r o N e t

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Circle 139 on reader service card

Power Mac News

Power Mac Sales on Target

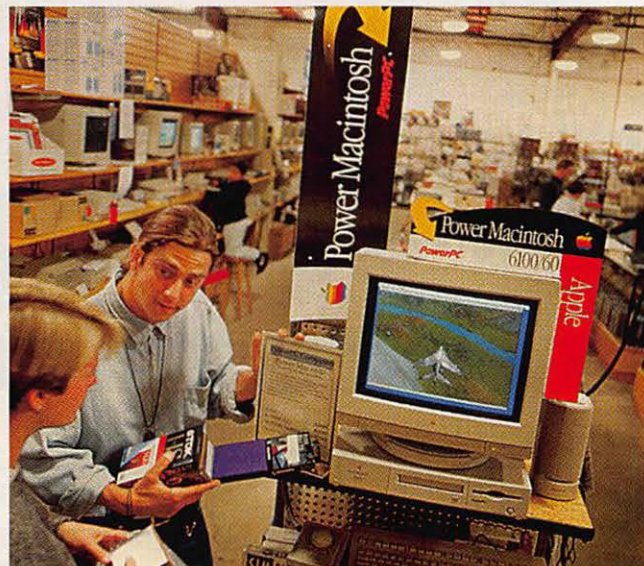
DESPITE SLUMP, THEY
OUTSELL PENTIUM PCS

Apple's first challenge with the Power Macs was to ensure high compatibility, and it succeeded. But an equally important concern was whether customers would accept the new machines. Initial reports show that, by and large, they have.

After high sales in the first two weeks of their release, Power Mac sales have flattened. But sales remain strong enough to stay in line with Apple's goal of selling one million Power Macs in the first 12 months after their March 14 introduction.

In those first two weeks—from March 14 to March 31—Apple shipped 145,000 Power Macs worldwide to resellers, with 65 percent placed in the United States. Shipments to resellers in the second quarter, ending June 30, are estimated to be another 200,000, and of those, about 150,000 have been sold to customers, according to Mike Murphy, a market analyst for the *California Technology Stock Letter*. Analysts and Apple expected some drop in sales once the first shipments filled reseller inventories. But the slowdown was greater than Apple had anticipated, analysts say, because of the initial lack of native Power Mac applications. Only recently have native versions been available for a variety of programs.

According to Computer InfoCorp Intelligence, the 6100 accounts for 65 percent



of Power Mac sales, the 7100 for 20 percent, and the 8100 for 15 percent. The 7100's low sales rate is surprising, given its high performance and moderate price.

The dearth of native applications is slowly easing: on March 14, only 30 apps were available in Power Mac versions; by mid-July, the number had grown to over 100.

Reacting to the Power Mac sales slump, Wall Street financial analysts caused a minor panic in Apple's stock price in late spring by raising questions about the Power Mac's success. However, computer-industry analysts, including Murphy, attribute the jitters to unrealistic short-term expectations, especially when Apple remains on target with its goal of one million Power Mac sales.

In contrast, Intel predicted it would sell about five million Pentium-based PCs in 1994, but analysts report Pentium sales lagging behind those of the Power Mac. One reason, Murphy theorizes, is

that many PC users recently switched to 66MHz 486DX-based systems (which outperform even Apple's top-ranked Quadras), so there was less need—or fewer funds—for another performance boost.

—PATRICK MCKENNA

Power Watch

THE LATEST ON PRODUCTS
FOR THE POWER MAC

More and more companies are offering native Power Mac versions of their software. Here's a list of the latest products (alphabetical by company name).

- Adobe Systems expects an August release of Adobe Type Manager 3.8, which runs in native Power Mac mode and supports the new QuickDraw GX font format used in System 7.5. The program will cost \$60; upgrade prices vary. 415/962-2630.

- Aldus's CoSA division has released the \$1995 After

Effects 2.0.1 video-effects program; upgrades cost \$99 (\$25 for copies bought after March 14). Also available is the \$495 After Effects Rendering Engine, which lets an unattended Mac render effects created on another Mac. 206/628-4526.

- Claris plans to release the \$399 ClarisDraw 1.0 and the \$249 MacWrite Pro 1.5 by September. Upgrades from MacWrite Pro 1.0 will cost \$29. The \$1499 FileMaker Pro Server shipped in July. 408/987-7000.

- Hash has released its \$999 Animation Master. Upgrades cost \$200. 206/750-0042.

- Kingston Technology offers 256K cache cards for the Power Mac 6100 and 7100; they cost \$295. 714/435-2600.

- Knowledge Revolution has shipped its \$1495 Working Model 2.0 mechanical-simulation software. 415/574-7777.

- Mainstay has released VIP-C 1.5, a visual C programming environment. It's priced at \$495; upgrades cost \$50. 805/484-9400.

- Microsoft plans a September release of Excel 5.0 and October releases of Word 6.0 and PowerPoint 4.0. Prices were not set at press time. 206/936-8661.

- Ray Dream has released the \$349 Ray Dream Designer 3.1, a 3-D design program. Upgrades cost \$29. 415/960-0768.

- Signal Analytics is shipping its \$1200 IPLab Spectrum 2.5 image processing and analysis software. Upgrade prices vary. 703/281-3277.

- Vamp has released its McCAD Trailblazer circuit-board autorouting software. Prices vary by configuration. 213/466-5533.—GALEN GRUMAN

Unveiling QuickMail 3.0. The Ultimate Delivery System.



This is how E-mail should be. Totally complete, ready to go, right out of the box. Chock full of everything you need to make the connection with virtually

anyone, anywhere. And so intuitive, so highly automated, you won't have to spend half of your life with a user's manual.

New QuickMail™ 3.0 delivers everything you need to communicate across the hall and around the world. So you can exchange messages and files with co-workers, no matter what kind of computer they're working on. With more than 150 third-party gateways and bridges, QuickMail connects you to pagers, Newtons®, fax systems and even other mail

systems. And you can access Apple-Link®, MCI Mail®, CompuServe®, the Internet and more.

QuickMail has always been the Mac user's

NEW! Powerful Search capability lets you locate filed messages in seconds.

NEW! MailManager™ can automatically reply, forward, file, print and even delete messages for you.

NEW! Built-in Spell-Checker for error-free messages.

Easy-to-install server and administrative software gets you up and running fast.

Clients for Mac®, Windows™ and DOS users, all with the same look and feel.

QM Forms™, an application to create your own custom electronic forms.

QM Remote™, for sending and receiving messages anywhere.

QuickConference™, for communicating in "real-time" on screen.

Gateways and bridges included FREE!

#1 choice. It was the first E-mail system specifically made for Mac networks. It's now being used by more than one million people and almost 50% of all Macintosh® users.

And even before this latest upgrade, QuickMail was also the choice of the experts. As *Macworld* proclaimed, "...with its combination of excellent user and administrator features, its ease of use in a mixed environment, and its improved remote access abilities, QuickMail retains its superiority in an increasingly competitive E-mail market."

If you happen to be stuck using one of those other LAN-based systems QuickMail is superior to, now you can make the switch to QuickMail and save with our special \$12 per user upgrade offer.

Because we think everyone should be

able to have the best choice in E-mail: QuickMail.



YES, I'M READY TO SWITCH TO QUICKMAIL FOR JUST \$12/USER!
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NAME _____	NUMBER OF USERS* _____ x \$12.00 = _____
TITLE _____	STATE SALES TAX† _____
COMPANY _____	SHIPPING & HANDLING** _____
ADDRESS _____	<input type="checkbox"/> MASTERCARD <input type="checkbox"/> VISA <input type="checkbox"/> AMEX TOTAL \$ _____
CITY/ST./ZIP _____	CARD # _____ EXP. DATE _____
PHONE () _____ FAX _____	CARDHOLDER SIGNATURE _____
CURRENT E-MAIL SYSTEM _____	<small>*QuickMail is available in 1, 5, 10, 25, 50 and 100 User Packs</small> <small>†CA, GA, IA, IL, MA & VA RESIDENTS</small> <small>**SHIPPING & HANDLING: U.S. \$5 CANADA & MEXICO \$10 OTHER INTERNATIONAL \$25</small> IMPORTANT: OFFER EXPIRES OCTOBER 31, 1994

New Products

THE LATEST MACINTOSH RELEASES

by Cameron Crotty

THIS SECTION COVERS MACINTOSH PRODUCTS FORMALLY ANNOUNCED BUT NOT YET EVALUATED BY MACWORLD. UNLESS OTHERWISE STATED, THE MINIMUM REQUIREMENTS FOR OPERATION ARE A MAC PLUS, WITH 1MB OF RAM, RUNNING SYSTEM 6. ALL INFORMATION AND PERFORMANCE CLAIMS ARE SUPPLIED BY THE PRODUCT VENDOR AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY MACWORLD. ALL PRICES ARE SUGGESTED RETAIL. PLEASE CALL VENDORS FOR INFORMATION ON AVAILABILITY.

HARDWARE

ActionLaser 1600

This 600-by-600-dpi true-resolution laser printer prints letter-size pages at up to 6 pages per minute. The printer automatically senses the protocol of an incoming job and, when combined with the Epson Talk interface kit for Macintosh compatibility (sold separately), emulates PCL 5 and PostScript Level 2. The ActionLaser 1600 has one parallel and one serial port (and a LocalTalk port when equipped with the Epson Talk kit), and all ports are simultaneously active. \$1199; Epson Talk kit \$499. Epson America, 310/782-0770, 800/922-8911; fax 310/782-5179.



ActionLaser 1600

Diamond Pro 15FS

This 15-inch, multiresolution color monitor automatically synchronizes to horizontal resolutions between 31.5kHz and 64kHz, which includes Macintosh resolutions from 640 by 480 pixels to 1024 by 768 pixels. The Diamond Pro 15FS's dot pitch is 0.28mm, and the monitor features on-screen controls for image centering, size, geometry, and color temperature. The Diamond Pro is MPR II-

and Energy Star-compliant. \$535. Mitsubishi Electronics America, 714/220-2500, 800/843-2515; fax 714/236-6171.

GatorRoute iR

This four-port router comes configured with two Ethernet connections (user-selectable thick/thin Ethernet and 10BaseT) and two serial slots for attaching either two high-speed WAN connections or one WAN port and one LocalTalk port. The GatorRoute iR simultaneously routes TCP/IP, Netware, AppleTalk, and DECnet protocols, and it supports tunneling of IPX and AppleTalk over TCP/IP. Users can manage the router via SNMP, Telnet, or the company's GatorKeeper software (included). \$3295. Cayman Systems, 617/932-1100; no fax.



GatorRoute iR

Magic 2GB Quarter-Inch Tape Drive

You can store up to 2GB of compressed data on one tape with this half-height, SCSI-2 tape drive. The Magic drive features a 1MB data buffer and sustained data-transfer rates up to 567 KBps with uncompressed data and 1.13 MBps with compressed data. A SCSI cable, a terminator, and Dantz's Retrospect 2.1 backup software are all included. \$699. MacProducts USA, 512/476-5295, 800/622-3475; fax 512/499-0889.

Magic 200 and 270

SyQuest's 200MB and 270MB removable-cartridge hard drive mechanisms have found yet another home. The SCSI-2 Magic 200 accepts 5.25-inch cartridges and features a 27.3ms average access time and a data-transfer rate up to 2 MBps. The drive also reads from and writes to 44MB and 88MB cartridges. The SCSI-2 Magic 270 accepts 3.5-inch cartridges and features a 22.7ms average access time and a data-transfer rate up to 2.4 MBps. The drive also reads and writes 105MB cartridges. Both drives ship with cables and CharisMac's Anubis formatting software. \$499. MacProducts USA, 512/476-5295, 800/622-3475; fax 512/499-0889.

Magic Spitfire

This 1GB, SCSI-2 hard drive features an average access time of 14ms and a sustained data-transfer rate up to 10.67 MBps. The drive ships with cables and CharisMac's Anubis formatting software. \$800. MacProducts USA, 512/476-5295, 800/622-3475; fax 512/499-0889.

MEOD 1301

A gigabyte of formatted storage might seem like a lot of room right now, but you'll fill it up in no time. So it's a good thing that this SCSI-2 magneto-optical drive is of the removable-cartridge variety. The MEOD 1301 accepts 5¼-inch cartridges and reads and writes both 512MB and 1GB media. When using the latter, the drive features an average access time of 44ms and sustained data-transfer rate of 870 KBps. \$3495. Procom Technology, 714/852-1000, 800/800-8600; fax 714/852-1221.

Model 370 LAN Spreader

A pair of these adapters, when plugged into the AUI ports of two 10BaseT hubs, will translate and transmit Ethernet packets over fiber-optic cable. The 10BaseFL protocol provides for segment lengths up to 2km, significantly extending the reach of your Ethernet network. The Model 370 draws power from the AUI port and has LED indicators that signal transmission and reception, link status, jabber, and collision. The fiber-optic connection uses ST connectors. \$294. Telebyte, 516/423-3232, 800/835-3298; fax 516/385-8184.

MRD 270

Based on the 3.5-inch SyQuest mechanism, this SCSI-2 removable-cartridge hard drive has an average access time of 21.8ms and a sustained data-transfer rate of 1.7 MBps. The MRD 270 provides 256MB of formatted storage on one cartridge. The drive comes with cables and a single, formatted cartridge. \$695. Procom Technology, 714/852-1000, 800/800-8600; fax 714/852-1221.

PanelBook 750

With a 1024-by-768-pixel resolution, this color LCD projection panel obviates the need for a large monitor or a three-gun projector to handle fine details when displaying complex graphics. The passive matrix PanelBook 750 measures 9½ by 2 by 11½ inches, weighs 5½ pounds, and can display just over 24,000 colors simultaneously on its 10½-inch-diagonal



PanelBook 750

display panel. \$7499. In Focus Systems, 503/692-4968, 800/294-6400; fax 503/692-4476.

PowerView 950

Intended for displaying high-resolution, finely colored images in presentations, this active matrix LCD projection panel has a 10.4-inch-diagonal screen that can simultaneously display 1.4 million colors at 1024-by-768-pixel resolution. The PowerView 950 measures 13 by 2 by 15 inches, weighs 6 pounds, and can be upgraded to accept composite-video input (NTSC, PAL, and SECAM). \$13,999; video-input option \$1000. In Focus Systems, 503/692-4968, 800/294-6400; fax 503/692-4476.



PowerView 950

Stallion TP

With this NuBus network interface card, you can run a high-speed FDDI network over Category 5 twisted-pair copper wire. The Stallion TP comes in two configurations: the Single Attached Station (SAS) has one RJ-45 jack, and the Dual Attached Station (DAS) has two. SAS \$1295; DAS \$2095. Team ASA, 619/279-2316; fax 619/292-1377.

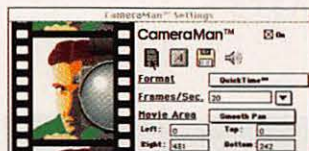
SOFTWARE

CameraMan 2.0

With this screen-recording software, it's "Lights, camera, action!" CameraMan continues

New Products

records all screen activity—including pull-down menus, pop-up windows, and cursor movements—to a QuickTime movie. Version 2.0 of CameraMan simultaneously records screen activity, Macintosh sounds, and voice-overs. Users can also synchronize sounds to specific points in the QuickTime movie and can change the size of the screen to emulate smaller screen sizes. 2MB min. memory. \$149. Motion Works, 415/541-9333, 800/800-8476; fax 415/541-0555.



CameraMan 2.0

Fables and Fiends: Legend of Kyrandia

There must be a rule that requires all rightful princes to go on a quest to restore their thrones. Your quest in this adventure game is to find the Kyragem—the source of all magical power. Along the way, you collect items, meet people, and solve puzzles, all of which bring you closer to the Kyragem and to Malcom, the twisted court jester who holds the secret of the Kyragem's disappearance. Fail, and your life and lands are forfeited. 3MB min. memory, requires 8-bit color. \$29.95. MacPlay, 714/553-3522, 800/736-5738; fax 714/252-2820.

The Flintstones Screen Saver Collection

Make way for the modern stone-age family. When you're not working at your Macintosh computer, you can watch a Bronto Crane take bites out of your desktop; listen to the Dictabird record and repeat sounds from your office; sing along with the "Flintstones" theme song (complete with bouncing rock); and see the paperboy drive across your screen, delivering the *Bedrock News*. 3MB min. memory; requires 8-bit color. \$34.95. Delrina Corp., 408/363-2345, 800/268-6082; fax 408/363-2340.

Flying Colors

This color paint program provides three levels of interface. You can hide all but the simplest tools for easy use by small children, reveal most of the tools and features for more advanced users, or run at the top level, with features like opacity control and masking. Flying Colors includes most common paint software tools and comes with premade backgrounds, image stamps, and clip art for younger users. 4MB min. memory; requires 8-bit color. Estimated street price \$40. Davidson & Associates, 310/793-0600, 800/545-7677; fax 310/793-0601.

ImageCels Botanicals

A collection of high-resolution bit-mapped images of plants and trees in 32-bit color. Each image comes with a detailed description that includes the plant's botanical name, common name, hardiness zone, seasonality, and size, as

well as the height and width of the image in pixels. Several hundred species are available, from evergreens to deciduous to succulents. All files are in TARGA format and are available either through Imagetect's DesignNetwork online service or on disk for an additional handling charge. \$10 per image. Imagetect, 408/252-5487; fax 408/252-7409.

Keying Effects

This is volume 2 in CoSA's Effects Pack series for the company's After Effects QuickTime video-editing software. The tools help users create mattes with fine detail from difficult subjects like hair and smoke. The package provides a range of mattes and keying functions, including multiple key colors, adjustable matte levels, and spill suppression. 8MB min. memory; requires Mac II, System 7. \$695. CoSA, a division of Aldus Corp., 206/628-4526; fax 206/233-7375.

Maps in Minutes

If you don't know where you're going, how will you know when you've



Maps in Minutes

arrived? This package contains a world map and individual maps of North America, Europe, and the United Kingdom, all layered with details ranging from political boundaries to drainage to population densities. The maps come in Adobe Illustrator or Aldus FreeHand formats (specify when purchasing). Requires graphics software. \$249. RH Publications, 206/774-1709, 800/713-5346; fax 206/774-0582.

Mathematica Finance Pack

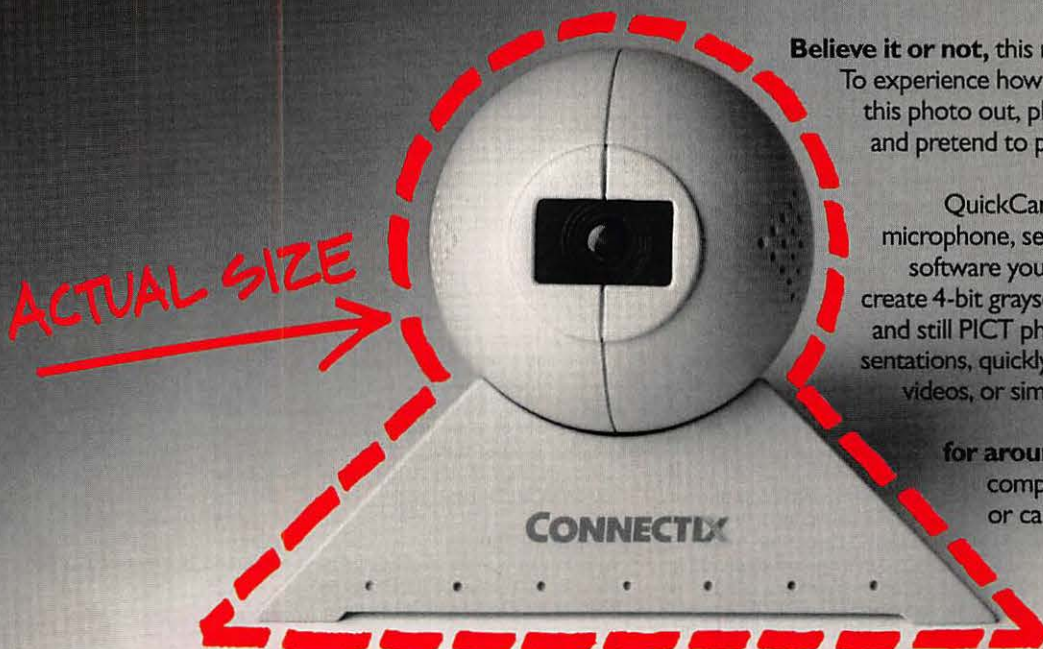
The complex world of high finance demands as much mathematical analysis as any of the hard sciences. The Finance Pack is a collection of tools for Mathematica designed to solve problems in such areas as interest rates, bonds, cash flow, and stock options. With these tools, users can analyze data, build mathematical models, display data graphically in two or three dimensions, and create animations. Requires Mathematica 2.0. \$395. Wolfram Research, 217/398-0700, 800/441-6284; fax 217/398-0747.

Medical House Call

What's up, doc? With this home medical-analysis tool and reference guide, your Macintosh can help you find out. As you respond to questions about your symptoms, the software responds with possible causes, helping you both organize the information you take to your doctor and understand your doctor's diagnosis. The software includes information on 1100 diseases, 515 common

continues

Introducing the **coolest**, least expensive video camera for the Mac.
Rehearse with this until you get your own QuickCam.



Believe it or not, this really is a video camera. To experience how easy QuickCam™ is, cut this photo out, place atop most any Mac and pretend to plug into the serial port.

That's it.

QuickCam comes with a built-in microphone, separate base, and all the software you'll need to immediately create 4-bit grayscale QuickTime movies and still PICT photos. Jazz up your presentations, quickly prototype multimedia videos, or simply amaze your friends.

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QUICKCAM

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Circle 191 on reader service card

IT'S GONE. AND YOU DIDN'T BACK IT UP.

FACE IT. YOU NEED to back up your files. Use Retrospect, the number one Macintosh backup software — backing up over one million Macs, at last count.

Dragging important files to floppy disks is not backing up. If you crash you'll be retyping and trying to recover files for days. And then still searching for what's missing months later. And what if there's a fire, theft, flood, or equipment breakdown?

With Retrospect from Dantz you'll be backing up to the storage device of your choice in seconds — including SyQuest, Optical, Bernoulli, floppies, and file servers. And just about any Macintosh tape drive you choose.



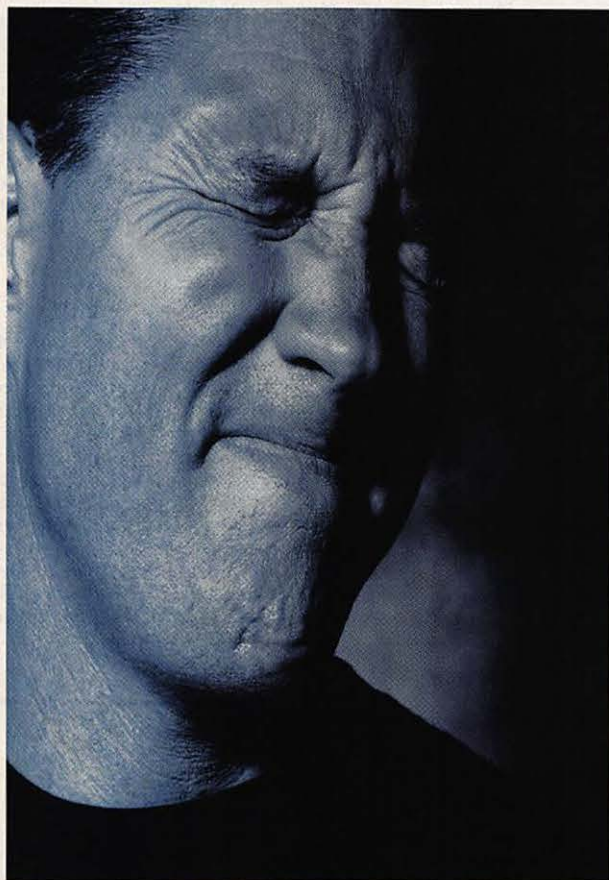
Retrospect packs more power than all the others put together.

AUTOMATIC OPERATION.

Simply point and click to create a script, then schedule it to run days, nights, or weekends.

WORLD CLASS RESTORING. Every preference file, document, application, control panel, extension and font is returned to its exact location. You won't miss a beat.

SECURITY. Retrospect has security covered, with full password protection at every entry point. Even encrypt data passed over the network to prevent snooping.



SPEED. Retrospect's customized drivers and interleaved data flow operate SCSI storage devices 20%-100% faster than any other backup software — guaranteed.



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NETWORK OPERATION. Back up a network of Macintoshes as easily as you back up one. Just install a Remote INIT (available in Remote 10- or 50-Packs) on each of your networked

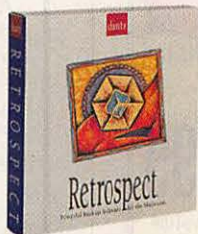


Macintoshes and include them in your backup scripts.

TOP INDUSTRY AWARDS. Don't just take our word for it. Listen to what experts say about Retrospect: "Retrospect has no equal." *MacWeek*, Diamond Award. "For backing up and archiving, there's nothing better." *Macworld*. And Retrospect Remote is a *MacUser* 1993 Editor's Choice Award winner.

The price for peace of mind? Well under \$200 — backed by a 30 day money back guarantee. Don't be caught off guard when disaster strikes, call your local dealer today.

Dantz Development Corp., 4 Orinda Way, Building C, Orinda CA 94563 (510)253-3000.



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New Products

medical tests, 2890 drugs (with interaction information), and 394 poisons (complete with antidotes and emergency procedures); it includes a 10,000-entry medical encyclopedia. 4MB min. memory; requires Mac IIci, 11MB of hard disk space. \$99.95. Applied Medical Informatics, 801/464-6200; fax 801/464-6201.

PKZip Mac

One of the most popular compression packages for DOS and Windows is now available commercially for the Mac. PKZip Mac creates both data-only and self-expanding archives, and it compresses the Mac-specific information separately so that the archives are cross-platform-compatible. Similarly, PKZip Mac can open archives created on other platforms, and it lets users choose either quicker or tighter compression and manipulate compressed files within an archive. \$119. Ascent Solutions, 513/885-2031; fax 513/885-2032.

Prince of Persia 2

Limber up your sword arm for this action-adventure game. Just when you thought you could settle down with the princess for a long life of leisure, fresh fruit, and cool marble palaces, the evil sorcerer Jaffar has returned. Disguised as you, he takes your place at the princess's side. Once again you are on the run, dodging and fighting through 15 levels of palace rooftops, ancient ruins, and secret caves. 4MB min. memory; requires 8-bit color. Estimated street price \$40. Brøderbund

Software, 415/382-4400, 800/521-6263; fax 415/382-4419.

QuickPrompt

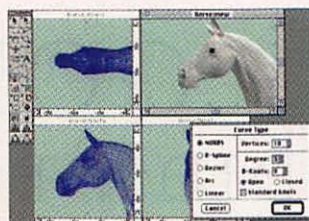
Saying the right thing at the right time can be the result of luck, talent, or a well-written script. This teleprompting software displays scripts in any font and size and includes a built-in word processor for text changes on the fly. Operators can fine-tune the scrolling speed of the text and communicate with the reader using such nonverbal cues as flashing the screen or adjusting the background color. QuickPrompt is WorldScript-compatible. Requires Mac II, System 7, video card for second screen. \$995. Questar Systems, 404/956-0700; fax 404/956-8781.

ScriptWizard

They don't call it programming, but writing scripts in AppleScript can be every bit as demanding if you don't have the proper tools. The ScriptWizard scripting environment has full testing and debugging facilities, including a variable-watcher window that displays the changing contents of all variables while a script is executing. An event-logger tracks and displays each Apple event as it is sent or received by a script. Requires Mac II, System 7.1. \$99. Full Moon Software, 408/253-7199; fax 408/252-2378.

Sculpt 3D

The latest release of this 3-D modeling software features free-form modeling tools, including B-splines, Bézier splines, and nurbs. You can shift models from



Sculpt 3D

one type of geometry to another—for example, smooth a polygonal model into a nurbs mesh and back again. Sculpt 3D includes a shading and ray-tracing rendering engine that can produce 64-bit images. A modeling-only version (Sculptor) is available, as is a version (Sculpt 4D) that includes both the renderer and an animation module. 4MB min. memory; requires Mac II, FPU. Sculpt 3D \$2995; Sculptor \$1995; Sculpt 4D \$3995. Byte by Byte Corp., 512/795-0150; fax 512/795-0021.

SmartVoice

Did you know that your Mac can speak? This collection of utilities uses Apple's PlainTalk technology to give your machine a voice. The package includes Apple's Speech Manager, MacinTalk II, MacinTalk Pro, and 14 voices, as well as Say It, a utility that adds speech capability to nearly any Mac application that can put text on the Clipboard. Just select a block of text, and Say It reads it aloud. SmartVoice also includes a talking scientific calculator; a talking clock; a utility that reads system messages aloud; and

SpeechLab, an application that customizes MacinTalk and saves spoken text as SND resource files. Requires System 7. \$49.95. Quality Computers, 810/774-7200; fax 810/774-2698.

Star Wars Screen Entertainment

Don't be surprised to find your monitor floating in the air after you install this collection of screen savers and screen posters. You'll see Jawas, Sand People, R2D2, Han Solo taking the Millennium Falcon into hyperspace, and Obi-Wan Kenobi dueling it out with Darth Vader. The package also includes movie-poster and conceptual-character art, blueprints for all the Star Wars vehicles, and a hidden message from George Lucas. Requires Mac IIci. Estimated street price \$35.95. LucasArts Entertainment, 415/721-3300, 800/782-7927; fax 415/721-3342.

Vistapro

Create just a corner of reality or entire worlds with this landscape-generation software. Given data from real or imaginary



Vistapro

Power Tools for the Power Presenter

One stop shop for all major brands



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For the latest in color projection panels and projectors call the experts in LCD technology. Your satisfaction guaranteed or your money back. Quick delivery via Fed-X or UPS.

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Circle 1 on reader service card

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Just set it & forget it

Attach any 4 serial devices including fax modems, MIDI, printers, even AppleTalk printers all to one Mac port and let Port Juggler deal with switching between them automatically.

momentum call 808 263 0088
fax 808 263 0099

Circle 8 on reader service card

Should the New MiniCad 5 be your CAD Program?

Take the Quiz.



Accelerated for
Power Macintosh

- I want a full-featured, proven market leader which can handle any job: 2D, 3D, cost estimation and client presentations.
- I want a program that runs on both the 68K-based Macintosh and the Power Macintosh. At no extra charge!
- I want a CAD program that is tailored to my needs, with specialized tools for architecture, mechanical engineering and design.
- I want an expandable CAD program which can be customized for specific solutions easily and inexpensively.
- I don't want to spend a lot for training or experience an enormous learning curve.
- I want an established company with constant R&D funding, so that my investment stays safe.



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Writing Coach

Battle writer's block, clarify your thinking, and better understand your reader with this set of 62 worksheets for ClarisWorks, WordPerfect, and Microsoft Word. The package includes editing and proofreading guides; exercises to help you overcome creative blocks; and outlines for business, academic, and personal writing. There's even a love letter template for prospective Romeos and Juliets with a bad case of blank-page syndrome. Requires word processing software. \$89. WritePlace Software, 503/484-6380, 800/264-7936; fax 503/686-3562.

CD-ROMS

The New Illustrated Information Finder

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PhoneDisc PowerFinder

The next time you need a phone number or an address, you can let your fingers do the walking—across your Mac's keyboard. This package contains the names, phone numbers, addresses, and zip codes of over 91 million individuals, businesses, and organizations nationwide. The PhoneDisc PowerFinder

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QuickTime: The CD 1994

See the winners from the International QuickTime Film Festival on this two-disc collection. The categories include animation, commercial, documentary, educational, experimental, humor, micro-movies, music video, and narrative. \$49.95. Sumeria, 415/904-0800, 800/478-6374; fax 415/904-0888.



QuickTime: The CD 1994

Shoot Video Like a Pro

Anyone can create video with a camcorder, but making it look good is another matter entirely—this disc contains a set of tutorials on sound, light, and shot composition. In each lesson, you get to experiment with the lights, microphones, and camera position on an imaginary shoot. The tutorials include specific advice from video professionals on how to get the results you want. \$59.95. Zelos Interactive Media Publishers, 415/788-0566; fax 415/788-0562.

Stock Options

These royalty-free photo vignettes are saved as CMYK files and are ready to drop into page-layout software. Items have been photographed on seamless white backgrounds, with unsharp masking already applied and outline paths created and saved for most objects. \$289. Digital Media, 714/362-5103, 800/786-2512; fax 714/643-2426.



U.S. Digital Topography

U.S. Digital Topography

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ACCESSORIES

Blackbird Tattoos

Apple's new PowerBooks don't have a trackball, so you can't customize them, *continues*

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New Products

right? Wrong. Blackbird Tattoos are Mylar overlays that fit on your new 500-series PowerBook's trackpad and stay put with nonpermanent, nonmarring adhesive. The tattoos come in sets of 20 with three-color designs that include a peace symbol, a panda, an eight ball, and a complete set of 1994-1995 calendars. \$10. APS Technologies, 816/483-6100, 800/235-2752; fax 816/483-3077.



Blackbird Tattoos

Charger 500

Batteries for 500-series PowerBooks have energy-monitoring modules inside them, and the Charger 500 uses information obtained from these modules to adjust current flow. The charger holds two batteries, and each slot has LED indicators that signal the battery's state. The Charger 500 can fully charge two batteries in 1 to 2 hours. \$179. VST Power Systems, 508/287-4600; fax 508/287-4068.

Digitus Ergonomic Mouse

This two-button ADB mouse has finger and thumb grooves sculpted into its

rounded surface. One button lies underneath where your middle finger normally rests, and the other is on the side, under your thumb. A switch on the bottom of the mouse determines which button is active. \$49.95. Assmann Data Products, 602/897-7001, 800/880-6601; fax 602/897-7255.

Disk-O-Lok

Here's a low-tech solution to a high-tech problem. To lock up the 3½-inch floppy drive on your Quadra or PowerBook, slide this tough plastic insert into the drive and turn the key on the 7-pin tubular lock. A laptop version is available with a cable attachment that secures the entire machine. \$19.95. Z-Lock Manufacturing, 310/316-7709; no fax.

TL-50

A set of powered external speakers can turn your Mac's squeak into a roar. This set is fully magnetically shielded and has bass and treble controls. The volume knob controls both speakers as well as an optional subwoofer (SB-8). \$179.95; SB-8 \$149.95. Labtec Enterprises, 206/896-2000; fax 206/896-2020.

BOOKS

FileMaker Pro 2.1 for Macintosh

The latest in the *Visual Quickstart Guide* series, this book by Adam Greif gets users up and running with Filemaker Pro 2.1. Readers get detailed, step-by-step instructions for common tasks, thor-

oughly illustrated with plenty of screen shots. 144 pages. \$12.95. Peachpit Press, 510/548-4393, 800/283-9444; fax 510/548-5991.

The Non-Designer's Design Book

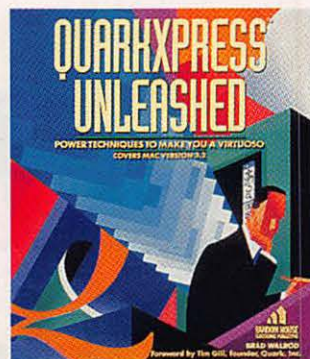
The desktop publishing revolution has made designers of us all—willing or not. This book was written by Robin Williams (author of *The Mac Is Not a Typewriter*) for those with no background or formal training in design. The first half concentrates on four general design principles—contrast, repetition, alignment, and proximity. The second half focuses on type, including the benefits and problems of combining typefaces. 144 pages. \$14.95. Peachpit Press, 510/548-4393, 800/283-9444; fax 510/548-5991.

Pricing Guide for Desktop Publishing Services

The first half of this book is a tutorial on the cost and pricing of desktop publishing services. The second half is a survey of business profiles and pricing in North America. The author, Robert Brenner, covers all aspects of desktop publishing, prepress, and printing—from generating copy to binding and shrink-wrapping. The book also profiles new and evolving services such as animation, modeling, desktop video, and image morphing. 512 pages. \$54. Brenner Information Group, 619/538-0093; fax 619/484-2599.

QuarkXPress Unleashed

Aimed at intermediate users, this book-and-software package guides readers




QuarkXPress Unleashed

from text preparation and typography through the complexities of incorporating graphics and building tables. An appendix describes the features of QuarkXPress 3.3 and lists available XTensions, XPress Tags, and service bureaus. Written by Brad Walrod. 491 pages. \$40. Random House Electronic Publishing, 212/572-2600, 800/733-3000; fax 212/572-4997. **m**

To have your product considered for inclusion in *New Products*, send an announcement with product name, description, minimum memory, peripherals required, pricing, company name, and phone number to New Products Editor, *Macworld*, 501 Second St., San Francisco, CA 94017. *Macworld* reserves the right to edit all product announcements.

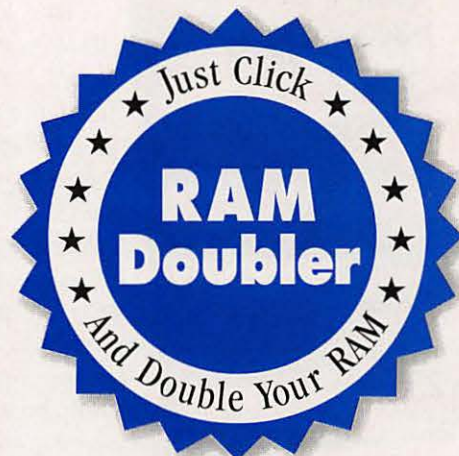
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RAM Doubler is an extension that works by reclaiming memory not being used. MacWEEK says "RAM Doubler couldn't be easier to use." It is the latest from Connectix, the Macintosh memory experts and makers of the award-winning CPU and MODE32.

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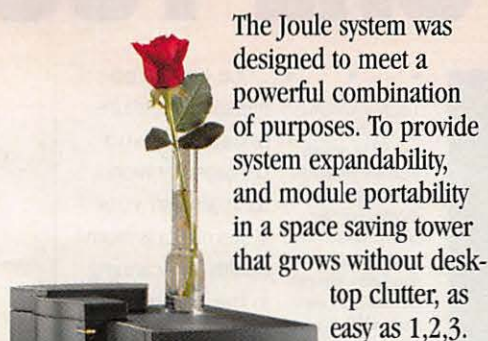
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There is nothing like the feeling of losing your data. There is nothing like booting up to find that your twenty-page conference report has burned to a crisp. Or watching a month's worth of virus-infected spreadsheets go up in smoke right before your eyes.

When it happens, a rush of job-security panic begins in your legs and rapidly bolts all the way up to your cerebellum. And the impact of losing all of your hard work affects you in a way you'll certainly never forget.

Data loss. It's one fiery disaster that makes for an awfully bad day.

PROACTIVE PROTECTION FOR YOUR MACINTOSH.

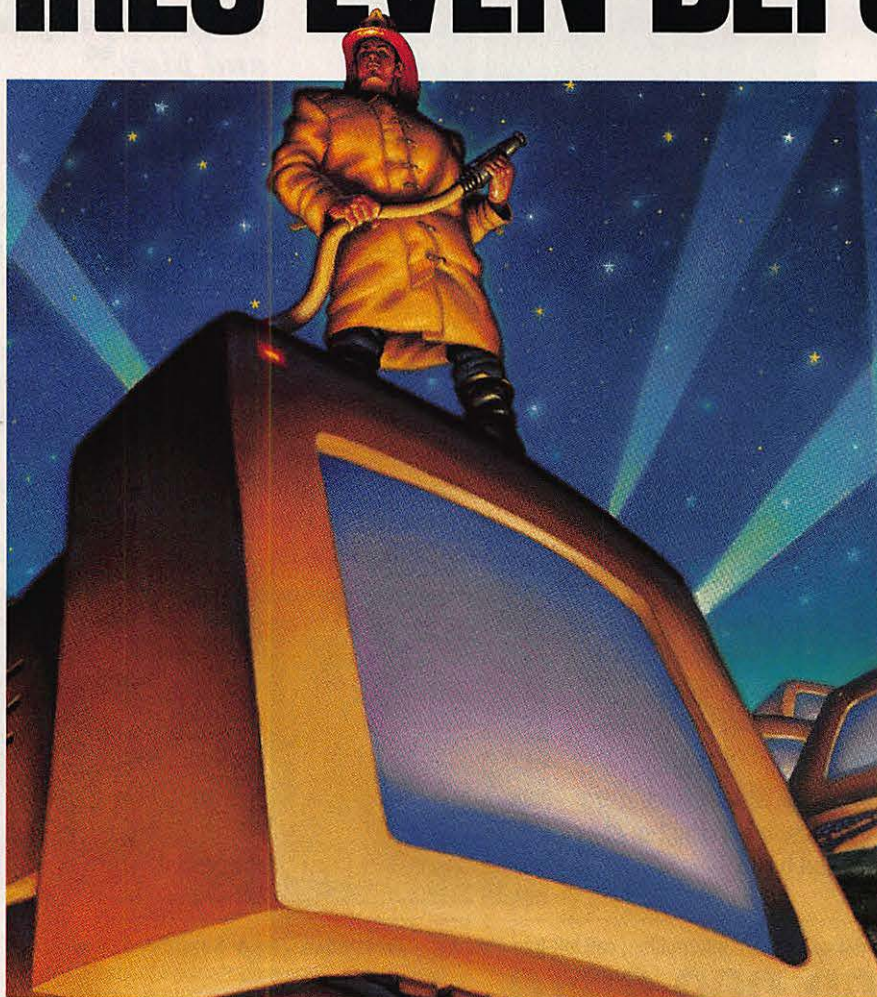
This being the way things are, at Symantec we subscribe to the theory that the best way to deal with a disaster is, well, to prevent it in the first place. Which is the very reason for our newly updated Norton Utilities® and SAM®. In a word, they're proactive. But to put it more poetically, this improved

data-protection software actually snuffs out fires without so much as the stirring of your mouse.

NEW NORTON UTILITIES DETECTS DAMAGE BEFORE DISASTERS HAPPEN.

For starters, look at our new Norton Utilities 3.0. We've taken the industry's most powerful data recovery and repair program and improved it to where it's almost invisible. So that now you can virtually load it and forget it.

NEW NORTON AND FIRES EVEN BEFORE YOU



◆ ◆ ◆ The enhanced Filesaver feature proactively and consistently works to maintain your system at premium health by scanning in the background for early signs of trouble. This new

The new versions of Norton Utilities and SAM provide proactive protection. Kind of like little firemen running around behind the scenes stamping out fires before they can ever start. So, even if it could've been a ten alarmer, you'll never hear a thing.

◆ ◆ ◆ agent-oriented technology is a Norton exclusive that personally reminds you when it's time to do basic data maintenance such as backing up or optimizing. In terms you can easily understand. It also automatically monitors your data for up to 500 deleted files so they can be easily recovered.

Once a problem has been detected, Norton Disk Doctor takes over. Improved Disk Doctor recommends a solution and then executes it on your command. It now hunts down, diagnoses, and repairs problems in more areas of the disk than any other software.

* Prices may vary. Shipping, handling and tax extra. This offer not good with other promotional offers. Resellers not eligible. Offer expires 12/31/94. Symantec, Norton Utilities and SAM are U.S.

The enhanced Speed Disk's unique customization feature lets you defragment everything from a whole volume to a selected file.

And Norton Utilities 3.0 now also includes enhanced backup. Which creates self-extracting and self-restoring backups of your data.

This improved capability makes it even easier for you to restore data during emergency situations. And our backup now also supports tape drives.



Peter Norton has always been well ahead of the pack when it comes to desktop data recovery and antivirus protection software.

greatest level of protection against new viruses as they are discovered.

The new SAM also scans for and destroys viruses in more types of compressed files than any other antivirus software can. SAM covers DiskDoubler, Compact Pro, Stuffit, and Now Compress. This ensures your ability to detect and eliminate a virus in any compressed file.

And for all of you who have a healthy appreciation for speed, the

means accelerated scanning speed, greater productivity, along with even more transparent protection.

What it shakes out into is that improved Norton 3.0 and SAM 4.0 now provide your Mac with the ultimate available levels of proactive protection against data loss. It's all rather amazing.

Then again, maybe all of these advancements are not so amazing. After all, Symantec is, of course, the proven industry leader when it comes to Mac data repair and recovery and virus protection.

SAM. THEY PUT OUT CAN SMELL THE SMOKE.

NEW SAM PROVIDES THE BEST PROTECTION AGAINST VIRUSES.

However, that's just the half of this proactive pair. We've also fully redesigned SAM 4.0 to provide the most complete and most effective virus protection, detection, and elimination of known and unknown viruses. So that what could turn

your entire system into a towering inferno never even becomes a spark.

One of SAM's exclusive features is automatic virus updating. Through your modem, SAM automatically dials the Symantec BBS daily, weekly, or according to any schedule you tell it to follow.

It then downloads the latest virus antidotes and updates your virus definition files. So you now no longer have to mess with manual updating. This assures you have the

improved SAM is also the faster SAM. The 4.0 version scans for viruses significantly faster than its predecessor. Which makes virus protection more seamless and less disruptive to your work flow.

Want more? Okay, SAM is also the only virus protection software that allows you to create a custom decontamination disk specific to your machine. This lets you reboot your Mac easily should your system crash from a virus.

The 4.0 version also simplifies the user interface by combining SAM Intercept and Virus Clinic into one easy-to-use component. This advancement allows you to configure more expert options from one convenient location.

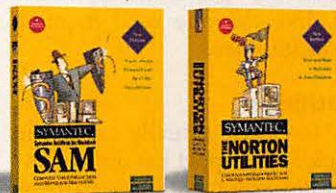
POWER MAC NATIVE.

While these new versions will protect your original Mac, they are also Power Mac native. So those of you with a Power Macintosh can take full advantage of the increased processing power. Ultimately, that

So, pick up the entirely new versions of Norton Utilities and SAM. And then, if you smell something burning at the office, you'll know it's either yesterday's coffee or that guy two cubes upwind who's trying to put out his fiery data disaster. That you well know could have been prevented in the first place.

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To keep data loss from casting a glow on the office landscape, call 1-800-628-4777, ext. 9FFF. If you own Norton Utilities and SAM, you can order upgrades for \$39.95 and \$29.95 respectively.* Or you can purchase the new versions at your software store.



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Reviews

PowerBook 540c

Macintosh Computer

PROS: User-expandable; holds two batteries; fast CPU; improved utilities; built-in speakers. **CONS:** Middling display quality; nonstandard batteries, memory, and Ethernet ports; lack of page-movement keys; fairly expensive. **COMPANY:** Apple Computer (408/996-1010). **COMPANY'S ESTIMATED PRICE:** \$4839; with 12MB of RAM and modem \$5539.

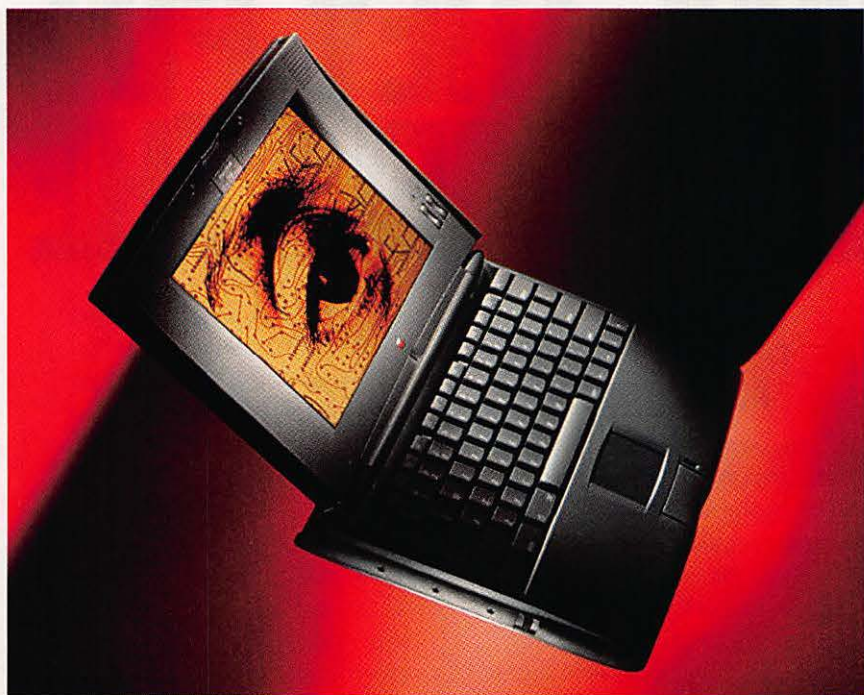


SLEEK, CURVY, FUTURISTIC. IT'S A notebook Lieutenant Commander Geordi LaForge might use on the *Enterprise*. The PowerBook 540c—the first all-new PowerBook design since the original PowerBooks of 1991—has a classic design that underscores Apple's ability to go beyond the boxy, mundane look of so many computers. The 540c's code name was Blackbird, and this PowerBook has a similar feel to the once-supersecret stealth spy jet.

Once you finish marveling over this nice-looking notebook, you may panic. I did. Just how do you turn it on—there's no power button in the back, as the other PowerBook models have. It's not on the sides, either. I actually had to look in the manual to find out how to turn it on: Apple has added a power-on key to the keyboard, like the one used in most desktop Macintoshes.

Better Utilities

Now the fun part: actually using the PowerBook 540c. Apple has greatly enhanced its PowerBook utilities. Particularly nice is the Control Strip that puts a lot of controls in one place—and that's good, because there are now simply too many PowerBook-related control panels. I count six, excluding the one for the optional internal modem. Some of the


MARK JOHANN

PowerBook panels are better arranged than in previous models, but more consolidation is needed.

The 540c also comes with a utility called the Launcher, something introduced with the Performa Macs that lets you put commonly used programs and documents in a window and launch them with a single click. It's basically the same idea as the Apple menu. As personal computing extends more and more to new users, these simple-use techniques are finding their way onto popular personal computers. But don't dismiss this as a dummies' option—it's convenient for power users, too, if you have the space on your desktop to display it.

A Trackball with No Ball

In setting up the various options, you're forced to quickly learn how to use Apple's

new trackpad pointing device, a touch-sensitive pad where the trackball used to be. I'm one of those people who dislikes trackballs, so I'm not sorry to see Apple abandon them. But the trackpad works just like a trackball, except that you move your finger along a pad rather than over a ball. The ballistics and motion patterns are essentially the same. So if you like the older PowerBooks' trackball, you'll like the trackpad. If not, go ahead and plug a mouse into the back.

The up-front, centered position of the trackball didn't work for me on the older PowerBooks, and it doesn't work for me on the 540c. When the keyboard is at a comfortable distance, the trackpad is too close, making me put my hand and forearm in an uncomfortable position. As someone recently recovered from a mild case of repetitive strain injury, I

am sensitive to body placement, and I would not use the trackpad for any extensive periods of time. As with all pointing devices, what is comfortable depends completely on your physique and working style, so try it yourself before reaching any conclusions.

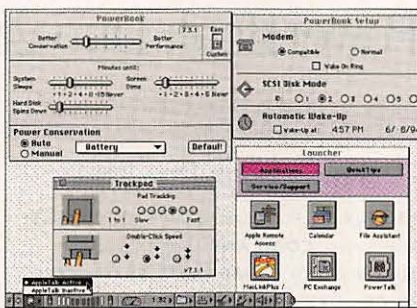
One caveat: if your fingernails are medium-length or longer, you may have difficulty using the trackpad. The pad must sense live human tissue (it works with cat paws, too, and probably other animals)—it won't work with fingernails. The tolerance seems pretty tight: I have very short nails but I could position my finger so the pad couldn't sense my touch.

So-so Color Screen

The 540c's screen—an active matrix, LCD panel—is a better version of what's in the PowerBook 180c, thanks to its larger size (9.5 inches diagonally, versus 8.4 inches). This makes the text more readable. Like the 165c and 180c, the PowerBook 540c's screen can display 8-bit color in 640-by-480-pixel resolution and 16-bit color in 640-by-400-pixel resolution. Apple should drop the non-standard 640 by 400 resolution and find a way to deliver 16-bit color to the standard 640 by 480 resolution.

Apple should also support VGA monitors at an appropriate refresh rate; like its predecessors, the 540c uses the flickery, minimum-standard 60Hz rate for VGA displays. (A Macintosh display typically runs at 67Hz, and most VGA displays run at 72Hz.)

In bright daylight, I found the PowerBook 540c's screen hard to read, even with optimal contrast and brightness settings. Forget using it outdoors. But even in a room with windows, with the shades drawn, you may have trouble. I did. In that case, use the bundled monitor cable to attach the 540c to a regular Mac mon-



Better Controls The PowerBook 540c comes with the well-designed Control Strip for easy access to PowerBook controls (bottom), more comprehensive setup control panels (top and middle left), as well as a special Launcher window for easy access to programs and files (middle right).

itor. However, in a windowless room, with standard fluorescent or incandescent lighting, the display was nice.

I do like the new dual switches on the LCD for brightness and contrast. Each push down increases or decreases (depending on which side of the switch you push) brightness or contrast. They're easy to use, and you don't have to fool around with a control panel to alter the brightness settings.

Expandable Notebook

The 540c is Apple's first expandable PowerBook, and the company has made a good first step to making its notebooks user-upgradable. The easiest upgrades on the 540c are through an expansion compartment on the left side, where you can install a second battery or a PDS card. And if you're willing to remove three screws, you can upgrade the memory yourself, add a modem card, and replace the hard disk with a bigger one (the 540c comes with a 320MB disk). This upgradability is long overdue and most welcome.

Most people will install a second battery. (Note that the batteries are a new

type and have a unique shape, so make sure you get a spare.) The 540c should work for about three hours under normal conditions with moderately aggressive power-conservation options set.

Other uses for the compartment involve plugging something into the PDS. Don't expect many products for this slot, though. The most likely ones will be PCMCIA cards, which are popular on PC notebooks. With a \$200 adapter plugged into the PDS, you can theoretically use two Type II or one Type III PCMCIA card. (Type II's are typically used for communications and networking add-ons, while Type III's are typically used for plug-in hard drives.) Since networking (even Ethernet) is built into the 540c and there's an internal modem slot inside the case, the need for expansion is not that great. Cellular modems and hard drives are the best bets for PCMCIA add-ons, but developers will have to write Macintosh drivers to get these devices to work in a PowerBook 540c.

The 540c can accept up to 40MB of system RAM, but once again Apple has created a new spec for PowerBook memory cards. That means memory for one model won't work in another, and the need for developers to produce multiple types of memory cards keeps the prices up. Apple also won't commit to keeping the memory used in the 540c compatible with its promised PowerPC upgrade.

One day—probably in spring 1995—Apple will release a PowerPC upgrade for the 540c. Details are sketchy, however. It might use a PowerPC 601 CPU, or a low-power PowerPC 603 CPU.

Whatever CPU is used, the upgrade promises to be straightforward: just pull out the daughtercard containing the 33MHz 68LC040 CPU and replace it with one holding a PowerPC CPU.

continues



PowerBook 540c and PowerBook Duo 280c: How Fast Are They?

CORE-PERFORMANCE INDEX

Times as fast as a Classic (Classic = 1.0).

Use these standard ratings of overall performance, based on a core test suite, to compare systems across classes.

Common

Typical business tasks in Microsoft Excel and Word that use the Mac's processor, drives, and video display.

Scientific

We added to the common tasks several scientific calculations (which use floating-point math).

POWERBOOK-SYSTEM PERFORMANCE TIMES

Times are in seconds. Shorter bars are better.

Use these results to compare the performance of systems for different types of real-world tasks within each class. For each type of system, results can be compared with other Macworld Business-System Performance Times.

Processor

Several tasks in Adobe Photoshop, Aldus FreeHand, Claris FileMaker Pro, and Microsoft Excel and Word.

Drive Access

File opens in Adobe Photoshop and disk-based sorts in Claris FileMaker Pro.

Video Display

Horizontal and vertical scrolling in Microsoft Excel and Word, and QuarkXPress.

Floating Point

Scientific recalculations (which use floating-point math) in Microsoft Excel.

■ Best result in test. Products are listed in decreasing order of overall performance.

	Common	Scientific	Processor	Drive Access	Video Display	Floating Point
Quadra 650	14.4	24.7	14	25	34	20
PowerBook 540c	10.3	10.9	17	34	74	73
PowerBook Duo 280c	9.9	11.2	18	34	50	70
Compaq LTE Lite 4/25c	9.7	23.3	24	42	61	18
Power Macintosh 7100/66*	6.6	6.5	35	36	43	242
PowerBook 165c	5.1	10.9	36	54	158	41
PowerBook 180c	5.1	10.8	36	52	167	42

*With cache running under emulation mode.

Pluses and Minuses

Many people use notebooks to give presentations, and Apple has given the 540c stereo output jacks and stereo speakers so you can use the Mac as a presentation system, even if you connect to an LCD projector or large monitor. However, if you use this notebook as a multimedia Mac, avoid the built-in microphone. It records—faithfully—the internal fan noise, polluting any recording.

The keyboard sports standard-size keys, not the slightly reduced ones featured in previous PowerBook models. And Apple has added a row of half-size function keys, similar to those on most PC notebooks. That's nice. But the 540c continues to have two keyboard deficiencies: no page-up, page-down, home, or end keys—frequently used in word processing—and no inverted-T cursor arrangement. The PowerBook keyboard should match the extended keyboard.

The 540c uses the LC040 CPU, which means there's no math coprocessor (floating-point unit, or FPU). That saves some money and reduces some heat internally, but it also slows the Mac down a little. Apple sang the praises of FPUs for the PowerPC, which has an exceptionally fast one, but keeps delivering Macs without them.

The built-in Ethernet ports are a great idea, but you may not be able to use them, since they aren't the standard size. Several network vendors are now offering adapters to solve Apple's design flaw.

The Last Word

All this power and sleekness and expandability comes with a price: about \$5200, based on street prices we've seen. For comparison, that's about \$700 more than it costs to get a fully configured Power Mac 7100/66. Or \$1000 to \$1200 more than a comparable PC notebook. (Yes, there are PC notebooks with stereo capabilities, active matrix color, dual-monitor support, and optional second batteries, although they give you the choice of swapping a floppy drive for the battery. However, I know of none that have these features plus built-in networking. Most don't have PDSs; instead they use a docking station for expansion.)

The 540c is the prestige PowerBook du jour. Don't rush out and buy it. But if you need what it offers, it'd make a good Mac for both on-the-road and in-the-office use. If you think of it as a dual-purpose machine, it's easier to justify the money, since even with a mouse, keyboard, and monitor at your desk, the total package costs less than having separate Macs for your desk and for your briefcase.—GALEN GRUMAN

PowerBook Duo 280c & Duo Dock II

Macintosh Computer

PowerBook Duo 280c

PROS: Fast CPU; longer-lasting battery. **CONS:** Small screen. **COMPANY:** Apple Computer (408/996-1010). **COMPANY'S ESTIMATED PRICE:** 4/320 base unit \$3759.



PowerBook Duo Dock II

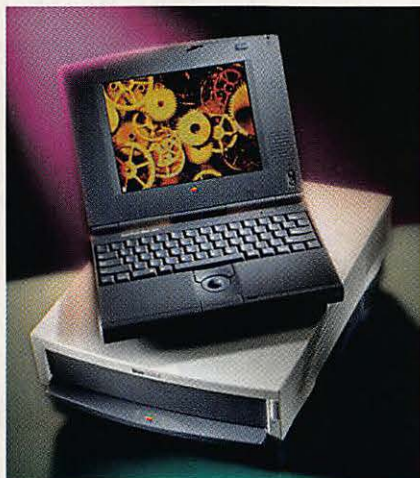
PROS: Includes Ethernet port. **CONS:** Difficult installation of NuBus cards. **COMPANY:** Apple Computer (408/996-1010). **COMPANY'S ESTIMATED PRICE:** \$969.



A QUADRA 650 IN A SUBNOTEBOOK? That's what the new PowerBook Duo 280c provides. Well, almost that much; the Duo has no math coprocessor (floating-point unit, or FPU). Still, that's a lot of power in a small box.

At first glance, the 280c looks just like its predecessor, the 270c. The similarity in appearance underscores the fact that the 280c is essentially a 270c with a faster CPU (33MHz LC040 versus 33MHz 030). Ironically, one advantage the 270c had was its FPU, which made it faster than the new 280c for some programs.

The active matrix screen, in my opinion, is too small (just 8.4 inches diagonally) to use for long periods. The 280c's screen is brighter, even in sunny rooms, than the screen used in the PowerBook 540c. The 540c's screen is larger (9.5 inches), which makes text readable but also makes it less bright. However, I'll take a slightly dimmer screen over a minuscule one any day.



There's also a new battery—called Type III—that offers about 15 percent more power than the previous model (Type II). Fortunately, the 280c works with any of the Duo batteries.

The rest of the Duo 280c is old news to a 270c owner—it includes the standard Duo docking-station port, trackball, serial port, and optional internal modem. But the increased processing power makes it a prospect for a desktop replacement.

To encourage that, the PowerBook Duo Dock II's main enhancement is the inclusion of an Ethernet port. (The new dock has an FPU and a 32K cache for use with the 030-based Duos. But the 280c can't take advantage of these two features.)

The other notable enhancement is support for 21-inch monitors at 8-bit color depth. The previous model was limited to 16-inch and smaller monitors.

But Apple has done nothing to improve the installation of NuBus cards in the Duo Dock II. You still have to take off the cover, remove the motherboard's restraining screws, pull the motherboard out of the way, align the cards against a bracket, and push the cards into the slot. While people don't change NuBus cards every day, this process could inadvertently damage a motherboard or other component. Even installing the NuBus cards is tricky, because the cards install sideways and it's easy to bend the guide pins as you align the cards. After the NuBus card is installed, you are likely to have more trouble putting the Duo Dock back together again. The Macworld Lab staff and I—all old hands at this sort of thing—looked more like the Marx brothers than professionals in our attempts.

The Duo Dock is your only option if you need to add cards. But if you don't need NuBus expansion, look at an Apple MiniDock or similar hassle-free product from another company that offers the same ports.

The Last Word

If you want to use the 280c as a replacement for your desktop Macintosh, I'd recommend you buy a PowerBook 520c or 540c instead (even with their limitations), since they have all the connectivity you need built in. But if you're a frequent traveler, you'll want a lighter Duo—the two pounds make a real difference. No other Duo offers such high performance as the 280c, and the price is OK. If you travel a lot, the Duo 280c is hands down the best portable Mac to get.

—GALEN GRUMAN

KEVIN CANDLAND

Fontographer 4.0.4

Font Editor

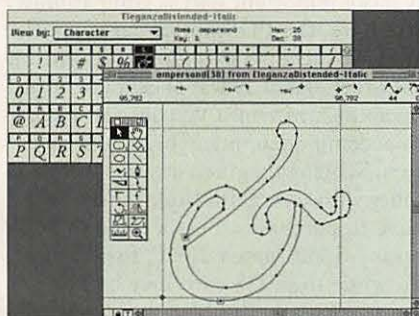
PROS: Full-featured; easy for typographic novices; automatic kerning and spacing.

CONS: Needs a powerful Mac to run quickly; bug-fixes and added features have put the manuals somewhat out of date. **COMPANY:** Altsys Corporation (214/680-2060). **LIST**

PRICE: \$495.



YOU MAY NOT THINK OF A FONT editor as a gotta-have-it tool, but Fontographer could change your mind. Although you may never design a new typeface from scratch, Fontographer makes it easy to modify existing faces. You can create hybrid blends between two typefaces, or add new characters—your logo, perhaps—to a house font.



Fontographer The drawing window features a complete set of Bézier drawing tools. You build character outlines from a series of curve points, straight-line points, and tangent points.

With Fontographer you can design new typefaces character by character and generate corresponding TrueType and PostScript fonts. There is no feature of these font technologies—hinting, kerning, Multiple Master variations—that Fontographer can't handle with the elegance you'd expect of a professional's tool. At the same time, the program is accessible and easy to use.

When starting a new font, Fontographer displays a grid with a box for each character. Click on a box, and a drawing window displays the boundaries of the em square on which your character will be based, as well as the baseline on which it will rest. The drawing tools resemble those used in Aldus FreeHand or Adobe Illustrator and, as with those programs, you work with easy-to-use Bézier curves. Fontographer has made the Béziers even easier: you modify a curve by simply grabbing and dragging any part of it—you don't have to wrestle with control points.

After you've finished one character, you move on to the other 255. To save effort, you can import scanned images of letters, and Fontographer will autotrace them accurately. You can also import EPS drawings, which is useful for adding logos or signatures.

Character-by-character design is time-consuming, but adjusting letter-spacing and adding kerning information can be even more tedious. Fontographer's excellent push-button autospacing and autokerning features take the drudgery out of these tasks. Discerning professionals can still tinker by hand, but the program works so well, there's little reason not to put it on autopilot.

For most people, Fontographer is especially useful for modifying existing fonts. The results won't look as good as professionally designed typefaces, but in truth, few people would notice any typographic infelicities. You can blend fonts of the same family to create, say, Bookman Semibold, or you can build professional-looking fractions and add them to your font. You can also dump from a font characters you don't use and replace them with characters from other fonts. Deleting unwanted characters can trim the size of your fonts—it's like giving your laser printer a memory upgrade, because you can download more fonts to it.

The problem with modifying typefaces is that you end up with fonts no one else has. If you design faces from scratch, you can distribute them as you please. But if your new font is based on modifications to an existing font, then you're still bound by that font's software license.

Professional type designers will want to run Fontographer on the mightiest Mac possible. It ran well on my IIfx, but I spent some time drumming my fingers during complex batch operations such as kern-list building. Still, the program runs adequately on almost any Macintosh with 4MB of RAM.

The Last Word

There are other font editors on the market, but none does more or works better than Fontographer. Letraset's FontStudio hasn't received the corporate support it needs to keep up with Fontographer, and programs such as Ares Software's FontMonger and Type Solutions' Incubator allow you to manipulate existing fonts but not create new ones.

Even if you never draw a single character, Fontographer can pay for itself just with the automatic transformations it enables you to perform on existing fonts. For the price of a few font families, Fontographer can give you a universe of unique faces.—JAMES FELICI

Power Mac Update

Aldus PageMaker 5.0

System Requirements 680X0 Macintosh: 8MB of RAM, System 6.0.7, Finder 6.1.7, 12.3MB of hard drive space. Power Macintosh: 12MB of RAM (16MB recommended), System 7.1.2, 15.5MB of hard drive space.

Company's Estimated Price \$639; registered users of PageMaker 5.0 can obtain a Power Macintosh version directly from Aldus for \$179; upgrade from a previous version of PageMaker \$299.

Company Aldus Corporation (800/685-3543).

Aldus Corporation has recompiled PageMaker 5.0 for the Power Macintosh, and this new version (5.0a) is now shipping. Version 5.0a has the exact same feature set as the current 680X0 release and operates identically. Version 5.0a does not ship with a Smart Install version, although it is shipped as a separate shrink-wrapped package.

Macworld Lab performed a variety of speed tests using a 1380K real-world PageMaker file. We tested how long it took to open the file, change the font in the entire document, import a graphic object, change the view to 400 percent, perform a scroll, and save the document as a PostScript file. Macworld Lab then averaged the results. We performed these tests on a Power Macintosh 7100/66 with 24MB of RAM and a 250MB hard drive, and for comparison we performed the same tests on a Centris 650 with 24MB of RAM and a 230MB hard drive.

MW LAB	Page Maker	
	5.0a	5.0
Power Mac 7100/66		
Native	133.61	
Emulated 680X0		266.27
Centris 650		
680X0		249.02

Average time to perform tests (in seconds).

The Centris 650 outperformed the Power Macintosh 7100/66 using the 680X0 version of PageMaker. When running software written for 680X0 CPUs, the Power Macintoshes performed at speeds between those of a IIfx and a Centris 650, according to our testing. Needless to say, no one should buy a Power Macintosh if they're only going to run emulated 680X0 software.

—LAUREN BLACK

Five Graphics Cards

24-bit Accelerated Graphics Cards

Apple Macintosh Display Card 24AC

PROS: Satisfactory price/performance ratio.
CONS: Can't switch resolutions from the keyboard.
COMPANY: Apple Computer (408/996-1010).
COMPANY'S ESTIMATED PRICE: \$1579.



Radius LeMansGT

PROS: Can switch resolutions on the fly via pop-up menu; automatic 30-bit CLUT calibration; fast.
CONS: No zoom and pan options. **COMPANY:** Radius (408/434-1010). **LIST PRICE:** \$2499.



RasterOps Horizon 24

PROS: Can upgrade ROM via software. **CONS:** Overpriced; no resolution switching; slower than anticipated; 13-inch card format. **COMPANY:** RasterOps (408/562-4200). **LIST PRICE:** \$1999.



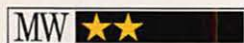
SuperMac Spectrum Power•1152

PROS: Relatively inexpensive; switch resolutions from the keyboard; fast; zoom and pan options.
CONS: Have to cycle through resolution options.
COMPANY: SuperMac Technology (408/541-6100). **LIST PRICE:** \$1399.



Tornado Graphics Card

PROS: Least expensive of the five cards; zoom and pan options. **CONS:** Slowest card with some applications; changes bit depth after you reboot on Power Mac. **COMPANY:** Mirror Technologies (612/832-5622). **LIST PRICE:** \$699.



ACCCELERATED GRAPHICS CARDS serve two functions. First, they display up to 16 million colors simultaneously on your computer screen, which is the standard for graphics and design professionals. Second, the cards speed up many QuickDraw routines, thus preventing any slowdown from using 24-bit

color display. Since we last reviewed graphics cards several months ago (see "Fast Track to 24-Bit Color," *Macworld*, April 1994), five new cards from an equal number of vendors—including one from Apple—have become available. All except the RasterOps Horizon 24 are the smaller, 7-inch variety; all five accelerate the display of 24-bit graphics on standardized Macintosh monitors; and all support 16 million colors on screens as small as 13 inches (640 by 480 pixels) and as large as 21 inches (1152 by 870 pixels).

As in our last video-card roundup, we found that accelerated video handily outpaces the 68040's unaccelerated on-board video but that the subjective difference between one accelerated card and another that costs twice as much is only slight. In using the cards over a period of several months, for example, I was dissatisfied with the pace of only two cards, the \$699 Mirror Tornado and the \$1999 RasterOps Horizon 24. The other cards performed so similarly I could hardly tell them apart.

Macworld Lab evaluated the five cards based on their ability to accelerate key operations. Rather than relying on an automated utility to judge performance, we sat down with stopwatches in hand and timed specific everyday tasks on 16-inch monitors. (We've found that the fraction-of-a-second speed differences detected by Hydra and other automated-testing utilities are both insignificant and misleading.) Our findings show that, sure enough, the Tornado and Horizon are slower than the competition at some tasks and equally fast at others. On the Power Mac, for example, the SuperMac Spectrum Power•1152 scrolled a PageMaker document in about a quarter of the time it took the Tornado, but the Tornado's speed was approximately the same as the Spectrum Power•1152's when previewing and zooming in both Aldus FreeHand and Adobe Illustrator.

The Power Mac Factor

No matter how much emphasis you place on the occasional speed differences between the five cards, the equally fast performance of the PDS cards included with Apple's Power Mac 7100 and 8100 calls the entire category of accelerated graphics cards into question. The 7100 PDS card comes with 1MB of dedicated VRAM and can be upgraded to 2MB, thus supplying 24-bit color to 16-inch and smaller monitors. The 8100's PDS card ships with 2MB of VRAM and can be

upgraded to 4MB, which accommodates screens as large as 21 inches. (The two Power Mac AV models also ship with a PDS card with 2MB of VRAM.) When using nonnative business applications such as Microsoft Word and Excel, I found the 7100's PDS card, equipped with 2MB of VRAM, to be slightly slower than the two fastest of the five third-party boards—the \$2499 Radius LeMansGT and the \$1399 SuperMac Spectrum Power•1152. Considering that the PDS card ships with all Power Mac 7100s and that it costs less than \$100 to add 1MB of VRAM, you might be able to live with this small speed difference. Meanwhile, Macworld Lab found that the PDS card actually performed faster than any third-party card tested when using native Power Mac graphics programs such as Aldus FreeHand 4.0 and Adobe Illustrator 5.5. (Previous Macworld Lab results show that the PDS video was slower when using prerelease native software.)

But speed is only part of the equation. A more important part is compatibility, and here, the PDS option fares poorly. Because the PDS card does not sync on the green signal, as was once the standard operating procedure, you need an adapter to accommodate many brands of monitors. Syncing on green ensures compatibility with several PC-style monitors. I'd have to purchase an extra cable to hook up my SuperMatch 20•T, for example. So while the PDS card may be fast, it's not particularly flexible.

The upshot is that if you own a Power Mac 7100 or 8100 and your current monitor works fine with the PDS card, there's no need to upgrade. But if you want a larger monitor or you want to take advantage of the special options offered by various cards, you have to look beyond the PDS solution. And if you own a non-AV Power Mac 6100, which neither ships with a PDS video card nor is compatible with one, you need a 7-inch third-party graphics card to access 24-bit color. (Since the 6100 lacks a NuBus slot, you also need a \$99 PDS-to-NuBus adapter.)

A caveat for users of Quadras and other 680X0 machines. Don't expect an accelerated video card to turn your graphics applications into speed demons. Upgrading from a Quadra to a Power Mac, for example, will have a greater impact on the speed of native applications such as PageMaker and Adobe Photoshop than will adding on a new graphics card. So if you have \$3000 burning a hole in your pocket and you can't decide whether to buy a Power Mac or an accelerated video card, the answer is obvious. Only upgrade your graphics card after the rest of your system is running at top speed.



24-Bit Cards: How Fast Are They?

Best results in tests where there is at least a 10 percent speedup over the next fastest card. Products are listed in alphabetical order.

VIDEO-PERFORMANCE INDEX

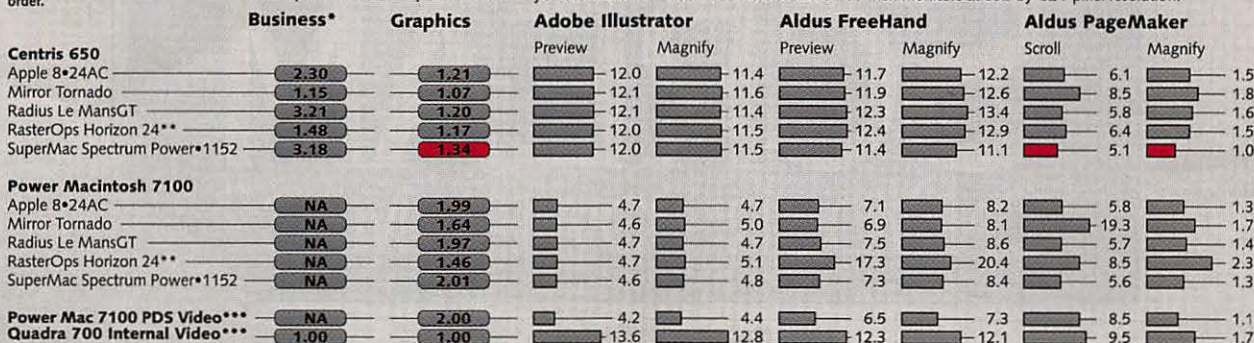
Times as fast as a Quadra 700's built-in video.

Use these ratings of overall performance to compare video cards' performance.

APPLICATION PERFORMANCE TIMES

Times are in seconds. Shorter bars are better.

Use these results to compare video cards' performance against each other for the applications you use most. All video cards were tested on 16-inch monitors at 832-by-624-pixel resolution.



*Native PowerPC versions of Word and Excel unavailable at time of testing. **Tested using version 2.01 of RasterOps installer. ***2MB of VRAM installed for 24-bit at 16-inch resolution.—Macworld Lab testing supervised by Tim Warner

Compatibility and Resolution

All of the video cards we tested fared well in the compatibility department. Each card worked with every monitor we tried. (The original release of the Apple Macintosh Display Card 24AC didn't sync on green, but the revised ROM 1.1 has remedied this problem.) All boards provide safeguards so that your screen is readable. The first time you use the card, it automatically cycles through various configurations until it finds one compatible with your monitor. With the Radius card, you can force a cycle by pressing the T key (of all things). You have to hold the key down until you find the desired configuration, at which time you release it. While not an intuitive solution, it maintains a centered screen image by accounting for timing differences between monitors.

Apple as well as Radius and SuperMac let you switch the resolution of your monitor without restarting the Mac. Using version 7.1.3 of the Monitors control panel (which includes Apple's new Display Enabler feature) you can switch resolutions via the Options button in the control panel. Only the Radius and SuperMac software, however, let you change resolutions from the keyboard. The Radius software lets you choose resolutions from a floating pop-up menu that appears at the touch of a key. The SuperMac solution is a bit more clumsy, requiring you to cycle through resolutions sequentially. However, the SuperMac software lets you pan and zoom in on a detail, as if the screen were only a window into a larger desktop. (You can zoom and pan using the Mirror software, but you can't switch resolutions on the fly.) Instead of panning, the Radius software redraws application windows and

shifts Finder icons to accommodate lower resolutions. The Radius software also provides a Finder Cleanup option, which rearranges the icons, whether they need to be rearranged or not, into columns on the far right side of the screen. If you're picky about the placement of your desktop icons—I know I am—all this shifting amounts to a continual inconvenience.

The Radius LeMansGT offers an additional capability that—for now—is more interesting than functional. The board includes a 30-bit DAC chip (the digital-to-analog converter chip that converts the VRAM's bits to the color signals of the monitor), which can generate 10 bits of data for each red, green, and blue color channel rather than the typical 8 bits per channel. Based on calibration settings, the Radius software then generates a color look-up table and translates the 10-bit data to the 256 most visually distinct values per channel. The idea is to prevent color duplication in high-saturation colors, such as bright reds and blues. Currently, this technology is relegated to three calibration presets that you access in the Monitors control panel. In the future, the 30-bit DAC will work with Radius's next generation of calibration hardware.

The Last Word

We had problems with only two boards—the Mirror Tornado and the RasterOps Horizon 24. The Power Mac version of the Tornado shipped with old software, necessitating our request for new software. The new software was incapable of remembering the bit-depth settings from one session to the next. Every time we rebooted the Power Mac, the screen appeared black and white.

The problems with the Horizon 24 are half, bad design and half, bad timing. Unlike the other cards in this review, much of the Horizon's ROM is included on disk, making it easier to update the product. But despite this, RasterOps was slower in updating its ROM code than was the competition. So while we were able to experiment with a beta version of the new ROM 3.0, which delivered faster results on the Power Mac—along the lines of the Apple 24AC card's results—our published tests reflect the speed of the sluggish but shipping ROM 2.0. Furthermore, the card includes 4MB of G-World RAM, which is capable of drawing bitmapped images off-screen. But so few applications support GWorld—a prominent exception is Adobe Premiere—that I wonder whether RasterOps, like other vendors, may drop this feature. RasterOps' 3.0 beta software has dropped GWorld altogether; instead, it automatically configures the RAM as a RAM disk. A RasterOps rep declined to share any future information about the card, but its present configuration makes it the poorest value of the five.

Of the five cards tested, the SuperMac Spectrum Power•1152 gets the highest recommendation, thanks to its relatively modest price and its quick performance (the fastest of the five cards tested). Certainly, the LeMansGT is every bit as good as the SuperMac card, and I even prefer many aspects of its software. But its high price makes it more attractive to graphics professionals who need sophisticated calibration options, and these options won't be available until Radius ships new software for its PrecisionColor Calibrator sometime in late September.—DEKE MCCLELLAND

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Power Macintosh Upgrade Card

Power Mac Upgrade

PROS: Inexpensive. **CONS:** Mediocre performance gain on some Macs; wastes a NuBus slot; uses the only PDS on the Centris and Quadra 610. **COMPANY:** Apple Computer (408/996-1010). **COMPANY'S ESTIMATED PRICE:** \$699.



APPLE'S NEW POWER MACintosh Upgrade Card gives current owners of 040-based Macs a less expensive upgrade path than the standard motherboard replacement. But depending on the machine you have and how you use it, the Upgrade Card may or may not be for you.

The Power Macintosh Upgrade Card is a 7-inch Processor Direct Slot (PDS) card that works with any Centris or Quadra (except the 605, the 630, and the AV models). In addition to the PowerPC 601 CPU and the Power Macintosh ROM, the card comes with a 1MB cache of static RAM. (Power Macs address RAM 64 bits at a time, but Centris and Quadra Macs are designed for 32-bit access. The large cache lets the card minimize the slowdown caused by accessing smaller chunks of data from RAM.) The Upgrade Card also sports a large heat sink to dissipate the heat generated by the PowerPC processor. An adapter is included for installation on the Centris/Quadra 610. The Upgrade Card requires a minimum of 8MB of RAM, which will probably have to be increased when features such as QuickDraw GX and PowerTalk

are implemented with System 7.5.

Most CPU upgrades use a standard clock frequency regardless of the platform. For example, the least expensive DayStar PowerPro 601 uses an asynchronous design that works at 66MHz no matter what Mac it is installed in. In order to achieve a smaller form factor for the Centris and Quadra 610, a shorter time to market, lower cost, and less design time, Apple decided that the clock frequency of the host CPU would govern the speed of the Upgrade Card. The card uses a circuit that doubles the CPU's clock frequency—for example, the card runs at 66MHz on 33MHz machines such as the Quadra 650, 800, and 950; but it achieves only 40MHz on the Centris 610, which normally runs at 20MHz.

To get a better feel for the Upgrade Card's performance, Macworld Lab tested all supported CPU speeds and compared the results with those of standard, nonupgraded Macs and Power Macs using both 680X0 and native applications.

Installing the card is straightforward—simply lift off the Mac's cover and insert the card into the PDS slot. To install it on a Centris/Quadra 610 requires a bit more work—you assemble the Upgrade Card onto the supplied adapter before inserting it into the PDS slot (it's only a few screws, though). The excellent, illustrated manual guides you step-by-step through the procedure.

To activate the Upgrade Card, your Mac must be running System 7.1.2. You use the Power Macintosh Card control panel to turn the card on and off. Other accelerator cards are activated by selecting Restart from the Special menu; the Upgrade Card needs to be turned off and

on physically for the change to take effect. The PowerPC CPU has a different start-up sound.

The ability to switch back and forth between a PowerPC and 68040 processor is definitely a good reason to recommend the Power Macintosh Upgrade Card. A prime example is running an 040-based 3-D package that requires the presence of the floating-point unit (FPU) found on 040 CPUs. To use the application on a real Power Mac, you would have to upgrade the package to a native Power Mac version or borrow an 040 machine, since there is no 040 FPU emulation on the Power Mac. With the Upgrade Card, you can keep your computer running with the 68040 processor and turn on the card when you need to run native Power Mac applications.

Unfortunately, the Upgrade Card takes up the only PDS slot, so you cannot use any other PDS card—for example, a DSP accelerator or cache card. Also, the Upgrade Card's length extends too close to the NuBus slot on most Macs, so you lose the use of that slot. With a Quadra 900 or 950, the loss of one slot might not be a problem, but for other NuBus-equipped Macs, it limits your expansibility. And on the Centris/Quadra 610, you lose your card-expansion capability altogether. A motherboard replacement, on the other hand, saves the slots and offers additional features such as 16-bit sound, GeoPort, and speech recognition, to name a few. (Of course, you can't switch back to the 040.)

Your buying decision depends on which Mac you currently own. If you have lots of 680X0 applications and intend to

continues



How Fast Is the Power Macintosh Upgrade Card?

■ Best result in test.

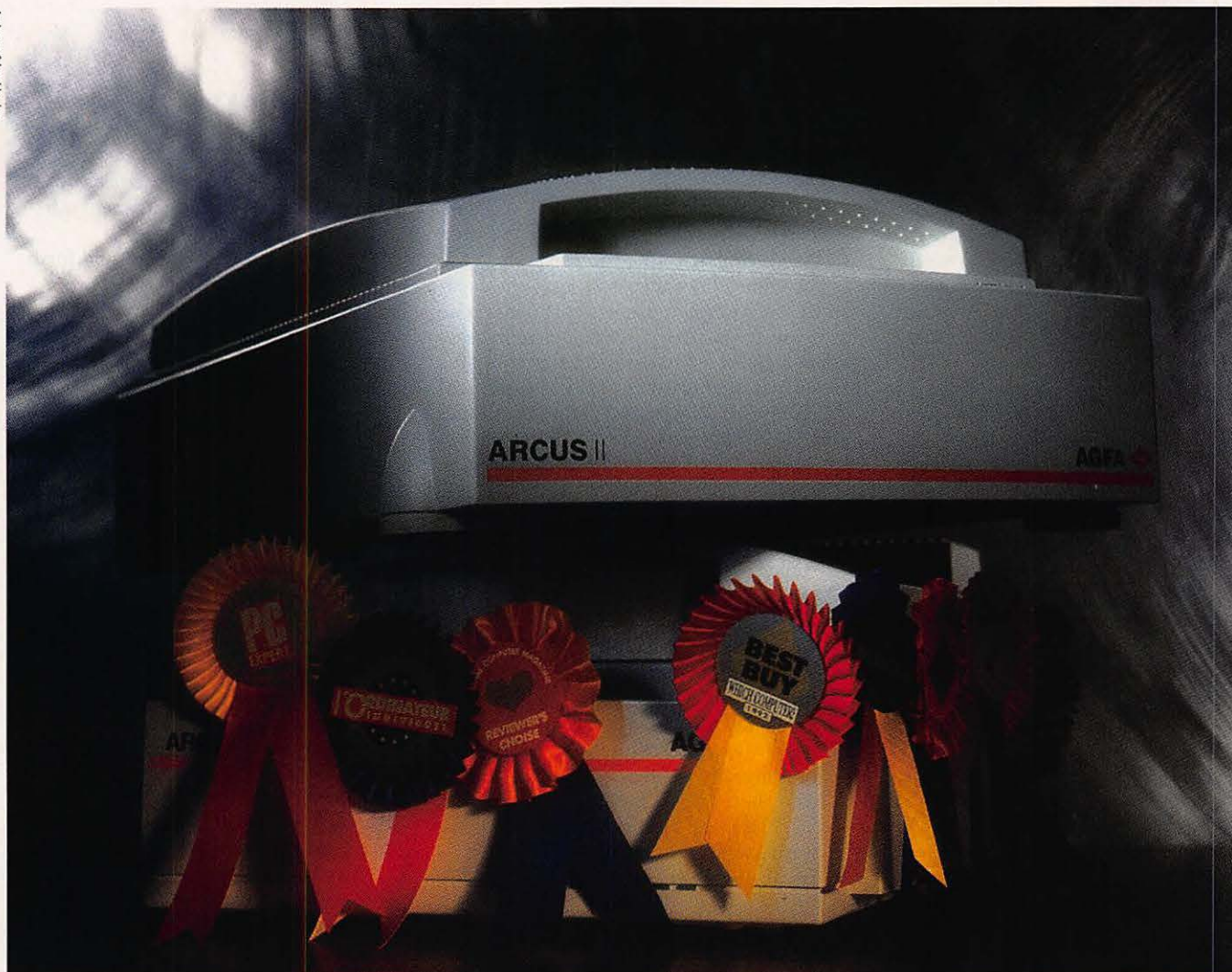
Products are listed in decreasing order of overall performance. Times are in seconds. Shorter bars are better.

	Adobe Photoshop 2.5			Aldus FreeHand 4.0		Fractal Design Painter 2.0		Infini-D 2.6	
	Gaussian Blur	Unsharp Mask	Change Mode to CMYK	Magnify	PrintPS	Apply Surface Texture	Adjust Dye Concentration	AutoClone	Render
Power Mac 8100/80	11.7	12.5	7.0	2.4	47.1	15.8	3.7	80.8	518.5
Power Mac 7100/66 w/ 512K cache	13.8	14.9	8.1	2.6	49.6	19.0	4.3	96.5	570.9
Quadra 650 w/ Upgrade Card	14.2	15.3	8.4	2.8	49.8	21.3	4.6	98.5	612.4
Power Mac 7100/66*	14.1	15.3	8.7	2.7	49.7	19.3	4.5	101.4	728.1
Power Mac 6100/60 w/ cache	15.6	16.8	10.1	3.2	51.9	21.1	4.9	107.8	685.5
Power Mac 6100/60	16.2	17.4	11.6	4.8	59.7	21.8	5.1	118.4	1092.8
Centris 650 w/ Upgrade Card	18.7	20.2	12.0	3.5	61.0	28.2	6.3	131.3	816.2
Centris 610 w/ Upgrade Card	23.3	25.1	14.7	4.3	61.0	35.5	7.7	176.2	979.3
Quadra 650	39.5	42.8	30.3	6.5	77.1	21.6	8.4	283.2	2005.3
Centris 650	49.3	53.8	38.1	7.9	70.8	28.1	10.7	345.7	2424.0
Centris 610	60.1	65.3	46.8	9.7	99.2	179.3	13.3	473.6	**

*7100/66 shipped with 256K cache. ** Couldn't run Infini-D due to the lack of a floating-point unit.

BEHIND OUR TESTS

To compare Macs equipped with the Power Macintosh Upgrade Card with the other machines, Macworld Lab used native Power Mac software for the Power Macs and 680X0 software for the 68040 CPUs.—Macworld Lab testing supervised by Mark Hurlow



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AGFA 
The complete picture.

upgrade gradually to native Power Mac programs, the Upgrade Card is a logical choice. If you want the benefit of native software and can't afford to lose a slot, a motherboard swap or trade-up is your only route. Otherwise, on a Mac-by-Mac basis, here's what I recommend:

- On a Centris/Quadra 610, you're better off with Apple's 6100/60 motherboard swap (\$999), since the price difference between a much faster 60MHz motherboard and the Upgrade Card is only \$300. In addition to the free PDS slot, you get an extra 4MB of RAM soldered onto the motherboard, plus all of the regular Power Mac features.

- If you own a Quadra 700, 900, or 950, the Power Macintosh Upgrade Card is the only way to upgrade to Power Mac performance—there are no motherboard swap options for these Macs. The only alternative is to go with the much more expensive, but supposedly much faster, DayStar PowerPro 601 card.

- Unless you need the features of the Power Macintosh, the Upgrade Card is an excellent choice for the Quadra 650 or 800. You'll get 7100/66 performance for about one-half to one-third the price of a new motherboard.

- Centris 650 owners are in a bind: a motherboard swap (\$1499) or trading up to a 7100/66 can be pretty steep, and the Upgrade Card offers only mediocre speed improvement. If you don't need the 7100 speed now, the Upgrade Card can save you several hundred dollars.

The Last Word

Apple's choice of a clock-doubling strategy instead of an asynchronous approach definitely limits the Upgrade Card's appeal. Current 33MHz machines will get the best bang for the buck, while other Macs won't realize as much of a performance gain. Nevertheless, the card offers an inexpensive upgrade path for those who've decided to move up to the Power Mac market.—MARK HURLLOW

Alacrity PM 6100

Power Mac Accelerator

PROS: Gives good performance gain. **CONS:** Installation voids Apple's warranty. **COMPANY:** KS Labs (614/374-5665). **LIST PRICE:** \$165.



A NEW COMPUTER SEEMS to live up to its performance potential only when you first get it. As you take the power for granted, the system seems to slow down. The Power Macintosh 6100/60 is no exception.

The Alacrity PM 6100 is a simple upgrade that boosts the clock rate of the CPU. Unlike clock-crystal boosters for the Mac II series that required modifying the motherboard, the Alacrity involves no modification at all—thanks to the design of the clock oscillator. KS Labs uses a clip-on assembly that essentially disables the motherboard's clock crystal. The Alacrity's crystal sends a faster clock pulse to the CPU, which makes the CPU run faster. The CPUs were designed to work faster than their rated speed—a 66MHz chip, for example, runs faster than 66MHz. KS Labs claims that over 98 percent of the 6100/60's it tested ran at 80MHz without problems. If a 6100/60 doesn't run with the 80MHz crystal, KS Labs will substitute a 78MHz crystal at no cost, or refund the purchase price.

The booster I tested had a 40MHz clock oscillator mounted on a test clip; a cooling fan for the PowerPC processor; a manual; and a disposable, grounding wrist strap to prevent static discharge to the motherboard during installation.

Installation is straightforward, and space clearance is not a problem. The Power Mac 6100's clock oscillator is located around the center of the moth-

erboard, away from the PDS adapter. (However, you must install the clip in the correct position—according to KS Labs, installing it in the wrong direction will permanently damage the new oscillator.) No special software is required, and the CPU is smart enough to identify itself as a 6100/80 instead of a 6100/60 in the About This Macintosh dialog box.

Since increasing the clock speed generates more heat and can shorten the life of the processor, KS Labs supplies a cooling fan to improve heat dissipation on the PowerPC processor. Macworld Lab measured and evaluated the temperature of the PowerPC processor and some of the ASICs (Application Specific Integrated Circuits) on the motherboard. After 24 hours of usage, we discovered subtle temperature variances before and after the Alacrity was installed.

When Macworld Lab tested KS Labs' clock boosters for the Centris 610 and 650 for a March feature ("CPU Boosters"), we found they were not compatible with some networking devices. This time we found no problems in file sharing and network printing with either AppleTalk or EtherTalk. We had no trouble with the 6100's microphone, floppy drive, CD-ROM player, external hard disks, and SCSI-based scanner.

Since there are some applications (especially 3-D rendering and spreadsheet recalculation) that benefit more from a cache than a clock booster, I recommend installing a cache card with the Alacrity.

Note: Installing a clock booster voids your Power Mac's warranty. (Apple does not endorse the use of clock boosters, but neither does it warn against them.)

The Last Word

At \$165, the Alacrity PM 6100 seems a bit expensive. But installing a clock booster is the quickest, cheapest, and easiest way to extract more performance from Apple's entry-level Power Macintosh.

—MARK HURLLOW



How Fast Is the Alacrity PM 6100?

■ Best result in test.

Products are listed in decreasing order of overall performance. Times are in seconds. Shorter bars are better.

	Adobe Photoshop 2.5			Aldus FreeHand 4.0		Fractal Design Painter 2.0			Infini-D 2.6
	Gaussian Blur	Unsharp Mask	Change Mode to CMYK	Magnify	PrintPS	Apply Surface Texture	Adjust Dye Concentration	AutoClone	Render
Power Macintosh									
8100/80	11.7	12.5	7.0	2.4	47.1	15.8	3.7	80.8	518.5
6100/60 with Alacrity & cache	12.2	13.0	7.2	2.7	49.0	16.1	4.0	82.3	568.6
7100/66 with 512K cache	13.8	14.9	8.1	2.6	49.6	19.0	4.3	96.5	570.9
6100/60 with Alacrity	12.5	13.4	8.2	4.7	56.6	16.8	4.1	94.7	1023.2
7100/66*	14.1	15.3	8.7	2.7	49.7	19.3	4.5	101.4	728.1
6100/60 with cache	15.6	16.8	10.1	3.2	51.9	21.1	4.9	107.8	685.5
6100/60	16.2	17.4	11.6	4.8	59.7	21.8	5.1	118.4	1092.8

*7100/66 shipped with 256K cache.

BEHIND OUR TESTS

To test the potential of these Power Macs, Macworld Lab used native Power Mac software. As shown in the benchmarks, the Alacrity PM 6100 accelerated most tasks. However, tasks like rendering in Infini-D and magnifying in FreeHand benefited more from the optional cache card than from a processor speedup.—Macworld Lab testing supervised by Mark Hurlow

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MicroPhone Pro 2.0

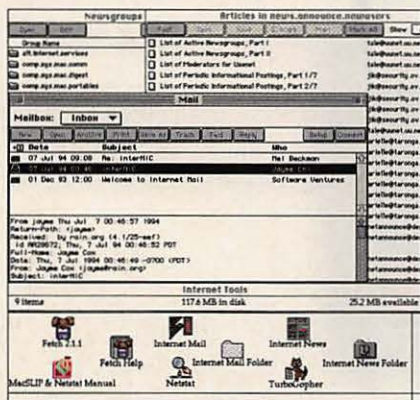
Communications Software

PROS: Multiple sessions; scriptable agents.
CONS: Poor installation instructions; weak fax and Internet tool integration. **COMPANY:** Software Ventures Corporation (510/644-3232).
LIST PRICE: \$295.



MICROPHONE PRO 2.0 ADDS A HOST of new features to the communications package: multiple sessions, fax send/receive, TCP/IP networking, Internet clients, and a graphical modem configuration. Not all of these enhancements integrate equally well with MicroPhone's existing suite of facilities, however.

The package consists of several program disks and five manuals of various sorts. The lack of a quick-start guide greatly complicates installation. You must first install the MicroPhone Pro program, then install the TCP/IP tools following instructions in the TCP/IP manual, then install the fax application using its manual. Aside from disjointed installation instructions, the manuals themselves are well written and easy to follow.



Net Worth MicroPhone's Internet tools include two script-based agents: Internet Mail and Internet News. The agents manage their own windows, putting a GUI face on text-only services in Unix.

MicroPhone Pro already had a good set of built-in features: Xmodem, Ymodem, Zmodem, and Kermit file-transfer protocols; VT52 and VT320 terminal emulations; Watch Me automatic script recording; button and icon palettes; and an integrated text editor.

New built-in features include CompuServe B+ file transfer, Wyse 50 and color PC/ANSI terminal emulation, multiple-session support, keyboard remapping, new script commands for custom windows, and a graphical interface com-

munications program called Power-Driver. The most significant feature is multiple-session support, which lets you use more than one communications service at a time. A Telnet connection tool for accessing Internet-based host systems is also included. Users of IBM, HP, Vidi-Tex, and Adds terminals will note the lack of emulators for their faves.

Those are the built-in features. Most of 2.0's features are add-on programs. Fax support comes from STF Technologies' Faxstf, a fax send/receive program with no connection to MicroPhone. Similarly, TCP/IP connectivity is via Hyde Park's MacSLIP. The Internet tools Fetch and TurboGopher are public domain programs developed by Dartmouth College and The University of Minnesota, respectively. Don't get me wrong, these are all great tools. But they aren't integrated with MicroPhone in any way. Other communications software vendors have integrated such features into their products, making them easier to learn and use than MicroPhone's collection.

If building custom communications front-ends is your forte, you'll find MicroPhone Pro's new windowing script commands useful. These commands let you build what Software Ventures calls *scriptable agents*. The new commands let you construct windows with embedded buttons, selectable item lists, icons, text fields, and multiple subpanes. A scriptable agent processes the communications data stream behind the scenes, presenting to the user a digested form of the online information. You can write agents to perform automatic online sessions or to help guide you through an online session interactively. MicroPhone Pro includes example scripts of each type: an Internet Mail script that logs on to a Unix host system to retrieve mail, and an Internet News script that lets you interactively access Usenet news from an Internet NNTP (Network News Transport Protocol) server. Most Internet providers offer these services over SLIP (serial-line Internet protocol), which the bundled MacSLIP package supports.

The Last Word

MicroPhone Pro's new feature set is a mixed bag. New features built into MicroPhone are genuine innovations that many users will be glad to have. But if you're looking for fax or Internet support, other packages such as Synergy's VersaTerm offer better integration and ease of use than MicroPhone Pro, and for considerably less money.—MEL BECKMAN

Animation Master

Animation Software

PROS: Affordable character-animation tools.
CONS: Un-Mac-like interface; hit-and-miss documentation. **COMPANY:** Hash Enterprises (206/750-0042). **LIST PRICE:** \$699.



ANIMATION MASTER 2.0.5—CONceived as an in-house production tool by the creators of the California Raisins—specializes in character animation, and is priced reasonably enough to attract budding Disneys. Although it packs extraordinary power, Animation Master is needlessly difficult to learn and prone to instability. Plus it's saddled with the look-and-feel of Windows.

Animation Master has seven modules—Sculpture, Character, Materials, Decal, Action, Direction, and Render—for building and texturing models, animating them, and rendering final images.

Sculpture, a spline-based modeler, can produce complex, organically shaped objects. In Sculpture you can extrude and lathe spline objects into more complex shapes, and a quick-shade button lets you preview contours. In the Character module, you can assemble separate elements, such as arms, torsos, and heads, into complete, hierarchically organized models. It also lets you apply surface attributes, such as transparency and specular, and edit surfaces to produce bump and reflection effects. You create and edit procedural textures with the Materials module, and Decal lets you apply bitmapped images that stretch and flex with object motion.

The Action module is a key-frame animator that links objects with spline backbones to produce realistic, coordinated movement. It can also morph an object's surface mesh to create flexing-skin effects. Final scene construction takes place in Direction, where you can add lighting and determine camera angles. The Render module produces 24-bit ray-traced images in PICT, QuickTime, and Targa formats.

Every object and texture can be associated with a channel for controlling the rate of motion or surface transformations. You can correlate channels to any part of a model, including individual surface points, to create subtle effects like a character's breathing or muscles rippling.

To produce an animation, you transfer models from one module to another. Given enough RAM, you can run all

continues

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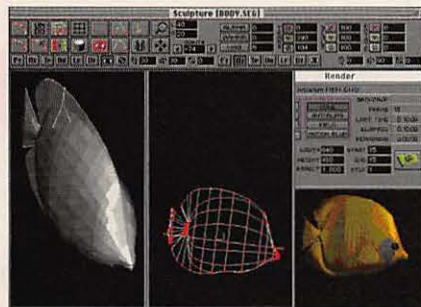
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seven modules simultaneously. However, Animation Master doesn't support publish and subscribe, so you must push the models through the pipeline by saving them in each module and reopening them in the others after every edit.

To use Animation Master efficiently, you need to learn its interface and its unique keyboard commands. Instead of movable tool palettes, the modules have fixed palettes holding tools, buttons, and numeric-entry boxes—lots of functions right at hand, but visually cluttered. And tools are not always logically arranged.

Animation Master is not forgiving. Support for undo, for example, is spotty at best. And its file organization is path-name driven; this Windows holdover



Builds Character Animation Master offers powerful modeling and animation tools—to those who can negotiate its interface and steep learning curve.

means the program does not recognize its own files if they are not in a project folder. Worse, if you rename any folder, the program makes you rebuild the path before it can recognize its files. All the error messages will remind you of why you bought a Mac in the first place.

I could go on, but you get the picture—Animation Master exhibits many of the shortcomings common to in-house applications. It takes perseverance to tackle the steep learning curve, and patience to put up with the system crashes.

Don't expect help from the manual—it's written for the Windows version but peppered with references to Macintosh, Amiga, and Silicon Graphics platforms. Mostly, you read the Windows sections and translate. Plus, it's equally inadequate on topics both simple and sophisticated. A tutorial video is included, but it covers only basic functions; the optional five-volume video tutorial is better.

The Last Word

Animation Master offers powerful modeling and animation tools at a reasonable price, and affordability sometimes makes up for a multitude of sins. On that score, Animation Master may merit your attention, but go in with your eyes wide open.

—CARLOS DOMINGO MARTINEZ

In Control 3.0.4

Personal Organizer

PROS: Excellent outline and to-do list features.

CONS: Database Lookup doesn't work well with some programs. **COMPANY:** Attain Corporation (617/776-1110). **COMPANY'S ESTIMATED PRICE:** \$85.



IN CONTROL STARTED LIFE AS A well-received outliner and to-do list manager that let you add multiple cells of data to each line in an outline. The cells allowed you to add dates, comments, or pop-up lists of data to each outline heading. In Control 2.0 added a calendar, but it was far less capable than competing calendar products. Version 3.0's main enhancement is a greatly improved calendar.

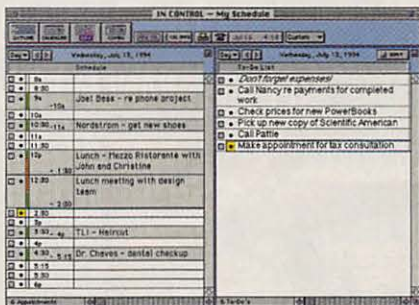
In Control 3.0 gives you more ways to view your data. In addition to the outline and monthly calendar views, there is now a day view that shows a detailed breakdown of the day's events and to-do's. There's also a new weekly view and a combo view, which lets you display the calendar in weekly or monthly view and outline in the same window. The calendar is now completely integrated with the outline, and you can enter and edit data in any view. You can also drag items from one view to another. When you update data in one view, the program updates the data in all other views. The program also lets you change the style and appearance of a view, including background colors and font size, style, and color.

Version 3.0 supports recurring events, banners to denote multiday events in the month and week views, and reminder alarms. Uncompleted to-do items carry forward automatically to the next day. In Control lets you check off events as completed, so you can search your calendar for unkept appointments. And the program can dial telephone numbers using a separate small Apple events-controlled Dialer application. You simply highlight a phone number and click on the Dial button to dial the number through a modem or through the Mac speaker.

The calendar's day view shows the day in configurable time slots (15 minutes, 30 minutes, or 1 hour). Scheduled events go into the time slots, and a busy bar next to the event indicates when you are busy. In Control displays a conflict bar next to the overlapping events (see "Too Much to Do").

In Control's new QuickStep feature lets you create macros for functions such as switching views, sorting, finding, and printing. You create a QuickStep by clicking on options in the QuickStep dialog box, or by having In Control watch and record as you perform a series of steps.

Another new feature is Database Lookup. This Apple events-based feature allows In Control to look up and copy data from Claris's FileMaker Pro 2.1, Portfolio Software's Dynodex 3.5, Now Software's Now Contact 1.0, and Aldus Consumer Division's TouchBase Pro 4.0 into an In Control cell. For example, you could select a name in an In Control view and have Database Lookup go to a contact file in FileMaker Pro, find that name, copy the phone number, and then paste the number into the phone cell in your In Control document. This feature worked well with FileMaker Pro and TouchBase Pro, but less well with Dynodex. Dynodex doesn't implement support for Apple events as completely as FileMaker Pro, so fewer of Dynodex's fields are accessible to In Control. You have to copy the whole Dynodex record, as opposed to a particular Dynodex field, thus making Database Lookup close to useless with Dynodex. I was not able to test In Control with Now Contact.



Too Much to Do This look at In Control's Combo view shows the to-do list, along with part of the daily schedule. You can see that there are overlapping events around lunchtime, marked with a conflict bar.

In Control also has a few oddities. For example, you cannot duplicate events in the calendar while holding down a modifier key, a feature that is common in competing programs. You can drag and drop items between different views, but you cannot copy across views, even through the Clipboard.

The Last Word

Personal organizers are, above all, a personal choice. In Control is an excellent to-do list manager and outliner, coupled with a good calendar. If you live or die by a to-do list, I recommend In Control.

—TOM NEGRINO






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dispatchers on the ground.  It's one of
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tive manuals that Delta writes
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MusicTime 2.0

Music-Notation Program

PROS: Easy to enter, format, and manipulate notes; excellent MIDI control; accepts input from computer keyboard, MIDI instrument, and MIDI files. **CONS:** No easy way to extract parts; advanced manual costs extra. **COMPANY:** Passport Designs (415/726-0280). **LIST PRICE:** 8-staff version \$149; 16-staff version \$249.



PASSPORT DESIGNS' MUSICTIME shares much with its older sibling, *Encore*, a professional music-notation product, but is geared for hobbyists and students with less demanding notational needs. To produce complex scores and parts, you still need one of the professional products. But MusicTime lets you enter music a note at a time or capture performances on a MIDI keyboard, then render them into standard notation, manipulate the musical elements, play the music back to a MIDI instrument, and print the notation.

Once you've set up your staves, keys, and clefs and selected track and patch assignments for MIDI playback, you have three ways to get music into MusicTime. MusicTime imports MIDI files—useful for people who are more comfortable with sequencers than with notation programs. Second, you can capture musical performance in real time or step time (a note or chord at a time) from a MIDI device. Finally, you can "play" music on your QWERTY computer keyboard, with the letters mapped to correspond to notes on a piano. Dragging an icon lets you change octaves. It's no substitute for a musical keyboard, but it'll do in a pinch. Scores entered in MusicTime play back exceptionally well, and the program's track mapping supports most of the current MIDI keyboards.

Having entered the notes on the screen, you can begin entering lyrics and guitar tablature, assigning dynamic markings, fixing the odd accidental, inserting slurs, and so on. Much of this data is not captured in MIDI performance, but most of it comes through in MIDI playback. Adding lyrics is as easy as typing them. The tools for editing and manipulating musical data are well designed, intuitive, and easy to master. MusicTime supports basic quantizing, which yields a more human sound from digital music. Tuplets, "ratioed" notes such as an eighth-note triplet, are easy to enter and edit.

The program ships with TrueType

and Type 1 fonts for both musical symbols and guitar chords, and MusicTime's printed output and on-screen notation rival anything on the market. You can write music in color, although I'm not sure why you'd want to. The musicians I used to test color output, from a 7-year-old beginning flutist to a symphonic tubaist, had trouble keeping the colors straight while trying to follow the individual parts in a score.

MusicTime's setup leaflet and *User's Guide* are both excellent, bringing you to the point where you can enter music and are acquainted with the tools' capabilities. To get beyond advanced-beginner level, however, you need the advanced guide, available from Passport Designs for \$19.95 plus shipping and handling.



Blue Guitar Colorized notes may help some students follow their individual parts through a score, but you may find it superfluous—as if Ted Turner colored your music.

Although MusicTime touts its usefulness for producing music for choirs and marching bands, the program offers no easy way to extract parts. That's a problem because ensembles don't play from complete scores, they play from parts. You can open a series of subfiles based on the score and wipe out what's not needed, but no one who's ever selected the Extract Parts option of *Encore* or *Coda's* *Finale* will be satisfied by that workaround. If you need extraction and expansion beyond 8 staves, you'll need to go elsewhere (Passport Designs sells a 16-staff version of MusicTime for \$249). MusicTime's only serious competitor in the same price range is *ConcertWare* (recently purchased by Jump Software from Great Wave Software and undergoing modification).

The Last Word

If beautifully printed scores are your goal, or you need nothing more complex than lead sheets and counterpoint assignments, or if you aspire only to have notated music whizzing from Mac to MIDI device, MusicTime could fill the bill, and at a great price.—RICHARD FENNO

ZipZapp 1.0

Data Reference Utility

PROS: Inexpensive; small file size; intuitive interface; instantaneous response. **CONS:** Window can't be resized. **COMPANY:** True Basic (603/298-8517). **LIST PRICE:** \$39.95.



ZIPZAPP CAN BE USED TO FIND A ZIP code if you have an incomplete address, to check the spelling of a city's name, to find the area code of a town, to determine someone's time zone, and to get a sense of a town's population size.

ZipZapp must be installed on a hard drive. The ZipZapp window consists of a single text field; a pop-up menu; and a scroll box listing more than 37,000 cities and towns in the United States (including overseas possessions), along with their corresponding states, zip codes, area codes, populations, and time zones.

ZipZapp lets you search by city name, area code, or zip code. As you type in each character, the program displays a list that matches your entries. For instance, when you enter the letter *M*, the first city starting with that letter—Mabank, Texas—appears at the top of the list. As you continue typing letters, the list scrolls to reflect the search string. ZipZapp instantly pops up with the information you need.

ZipZapp displays only a range of codes for cities with more than one zip code. To find an exact zip code, you'll have to consult United States Postal Service sources or one of the mail-list-management programs reviewed in the September 1994 issue of *Macworld*.

ZipZAPP						
Search For:	m	Search By:	City			
City	State	Zip Code	A.C.	Population	Time Zone	
Mabank	TX	75147	903	16,048	Central	
Mabel	HI	55954	507	1,470	Central	
Mabelvale	AR	72103	501	9,318	Central	
Maben	MS	39750	601	1,286	Central	
Maben	WV	25870	304	415	Eastern	
Mable	WV	26278	304	427	Eastern	
Mableton	GA	30059	404	22,322	Eastern	
Mablescott	WV	25871	304	2,480	Eastern	
Mabton	WA	98935	509	2,570	Pacific	
Mac Arthur	WV	25873	304	1,404	Eastern	
Macatawa	MI	49434	616	432	Eastern	
Macclenny	FL	32063	904	9,749	Eastern	
Macclisfield	NC	27852	919	4,145	Eastern	
Macdoel	CA	96058	916	832	Pacific	

Fast Searches ZipZapp displays a wealth of information in the blink of an eye.

I found only one minor fault: there's no resize box, so you can't stretch or shrink the window. True Basic plans to offer annual updates to ZipZapp reflecting changes in zip codes, area codes, and populations. The \$9.95 update price is reasonable and promises to make this program even more useful.

—OWEN W. LINZMAYER

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Conflict Catcher II 2.1.1

Extension-Management Utility

PROS: Solves extension conflicts, even three-way; identifies Power Mac-slowing extensions; extremely customizable; clean interface; balloon help. **CONS:** None. **COMPANY:** Casady & Greene (408/484-9228). **LIST PRICE:** \$79.95.



HERE'S A SOBERING THOUGHT: A FULL installation of System 7.5 puts 106 control panels and extensions into your System Folder. Trouble is, extension glut is one of the most common causes of Mac glitches, hangs, and crashes.

That's why, ironically, System 7.5's 106th extension is an extension manager, which lets you turn selected extensions on or off at start-up. That's somewhat useful when you're trying to figure out which extension is causing your crashes, but it's not good enough when you have 106 possible culprits and 11,236 possible pairs of culprits.

Conflict Catcher II is an extension manager, too. If you press the spacebar as your Mac starts up, you're shown a list of every extension and control panel in your Mac. At this pause in the Mac's start-up

sequence, you can switch extensions on or off (by clicking); rearrange the loading order (by dragging); view them sorted by type, name, or loading order (using a pop-up menu); group them into mutually required, or mutually incompatible, clusters (by clicking on a Links button and working in a slightly confusing dialog box); or group them into named subsets.

Conflict Catcher II goes well beyond the basics. For example, if you're having some mysterious glitch or crash, you click on CC's Conflict Test button. It asks you to restart the Mac several times. Each time, CC turns off a mathematically calculated subset of extensions, then asks you if the conflict still exists. After a few restarts, CC triumphantly names the problem extension and even offers to turn it off for you. The entire process takes five minutes, and the peace of mind (and subsequent smooth Mac operation) it brings is priceless. CC can even tell you if your problem was caused by the interaction of multiple extensions.

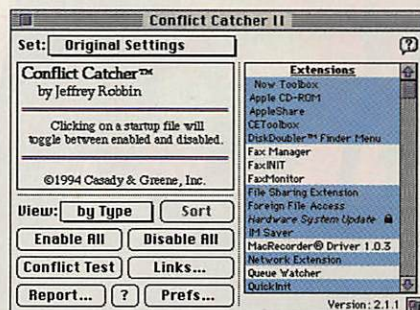
For Power Mac users, CC has an added attraction. Unfortunately, pre-Power Mac, nonnative extensions exact a serious overall speed penalty on these machines. CC's Report function tells you which extensions aren't written in native code, and even hints

at which ones will slow down your Power Mac the most. PowerBook RAM-disk users and network users will also appreciate CC's ability to load extensions represented on the start-up disk only by their aliases.

CC can also list your fonts and the contents of your Startup Items folder, treating them like extensions that can be switched off, added to groups, and so on.

CC is customizable, fast, and safe (it works by moving turned-off extensions into a Disabled folder, not by modifying them). There are few certainties in Mac computing, but one is that more extensions and control panels will walk the earth with every passing month. Conflict Catcher II is ready.

—DAVID POGUE



CC's Main Window Secret feature: ⌘-option-shift-click on the logo to find out how much the national debt increased during your last start-up.

Spyglass Plot 1.0

Scientific Charting Software

PROS: Handles huge data files; reads HDF files; most chart formats are publication-ready; extensive math capabilities, including FFT. **CONS:** Limited chart assortment. **COMPANY:** Spyglass (217/355-6000). **LIST PRICE:** \$295.



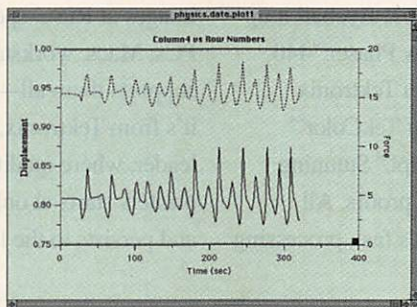
SPYGLASS, INC., IS THE COMMERCIAL manifestation of visualization work started at the supercomputer center associated with the University of Illinois. The company's products include Spyglass Dicer, which displays in vivid, false colors the kind of volumetric data associated with fluid-dynamics, meteorological, and astrophysical computation; and Spyglass Transform, which generates surface and vector plots from tables of two-dimensional data.

Spyglass Plot is the new one-dimensional partner of these flashy products. Few scientific journals support QuickTime data movies (most don't offer color), so there's a need for a product that makes journal-ready charts for traditional publishing.

Spyglass Plot has staked out a sharply defined area of the charting world that's of

interest mainly to scientists (see "Graphing beyond Excel," *Macworld*, August 1994, for a charting-package roundup). In Plot, every graph is really either a line chart or a scatterplot, although double-Y, number-scatter, and line charts with error bars are listed separately. Control over legends, labels, tick marks, error bars, increments, and grids is extremely simple, usually involving no more than double-clicking on the element to be edited and working through self-explanatory dialog boxes.

Ordinarily, these features would qualify Spyglass Plot as a somewhat austere alternative to Igor or KaleidaGraph. But Plot has the ability to handle giant data files at a high speed. Like Dicer and Transform it



Simplicity Itself Plot's charts are easy to make, easy to edit, and can handle more data than any of the program's competitors.

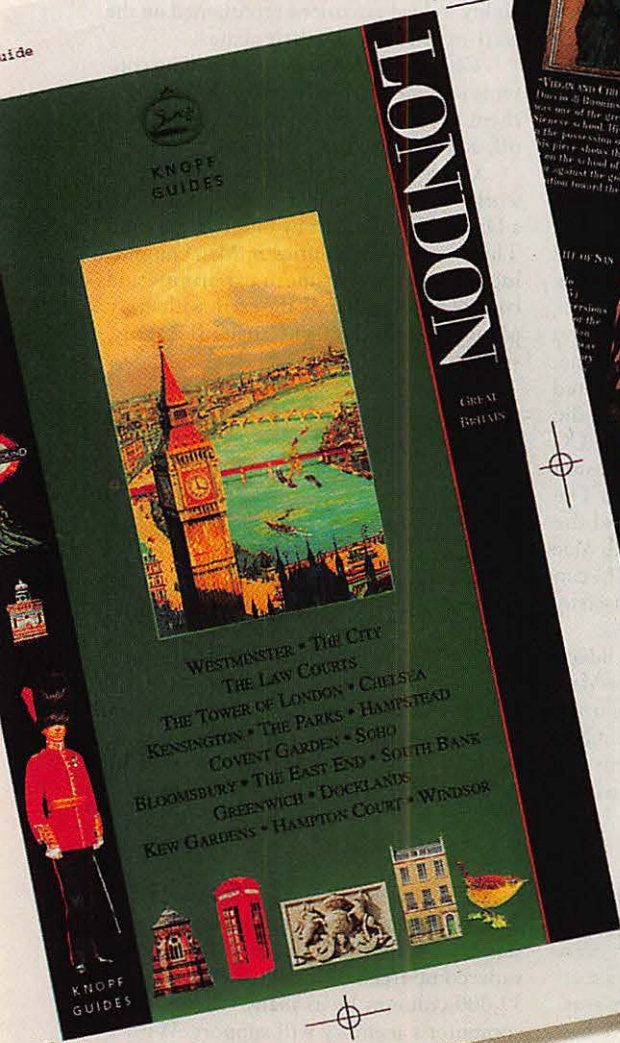
reads Hierarchical Data Format (HDF) files, including the vertex set type (these are standard data-interchange formats for supercomputers). Plot handles tables of 32,000 columns by as many rows as your computer's memory will support. With a quick sampling scheme, it can call up a scatterplot of 25,000 data points in just a few seconds on a Quadra 610; this task choked all other charting packages in comparative tests. Direct exchange of data between Plot and Transform also lets users explore practical publication alternatives.

Plot features Spyglass's macro language for math manipulations; however, a built-in menu or small library of macro scripts would be much more convenient for frequently used operations (for example, Fourier transform, autocorrelation, and data statistics). A superfast curve-fitting routine is built into Plot's Data menu, so perhaps Spyglass will add other popular routines in the next version. Plot's macros use the same language as those in other Spyglass products (graph formats are actually stored as macros). AppleScript is supported more as a necessity than a convenience.

If you're a Transform or Dicer user, or if you just have more data than your present plotting program can handle, you need Spyglass Plot. It's not for everyone, but it's the first choice for serious large-set plot crunching.—CHARLES SEITER

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Maple V 3.0

Symbolic Computer Mathematics

PROS: Compact; efficient; now includes type-set math display and better color graphing.

CONS: Improved display is a bit slower; third-party support still lacking. **COMPANY:**

Waterloo Maple Software (519/747-2373). **LIST**

PRICE: \$795.

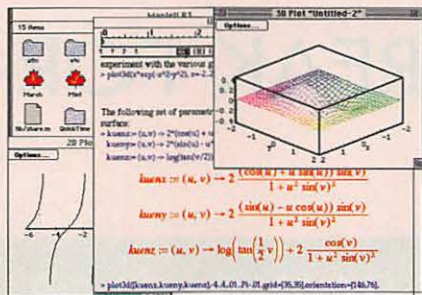


IN THE ESOTERIC REALM, WOLFRAM Research's Mathematica and Waterloo Maple Software's Maple V contend for supremacy in symbolic math. (Symbolic math, roughly, means that this software can give answers as equations and relations rather than just numbers.)

Release 3.0 of Maple V contains nearly everything a working scientist could reasonably want. First, the company recently bought Expressionist (an equation-typesetting program) and Theorist (the friendliest symbolic-math program) from California-based Prescience. The acquisition of Expressionist resulted in on-screen real-math-notation equations as a replacement for the Courier-font kludge that characterized earlier versions (the equations are

exportable to LaTeX). Maple's output now compares favorably with the output from specialized graphing and math-typesetting programs. EPS and color PostScript support, both long overdue, have been added since our last review of Maple V. A minor problem is that this new output takes longer to produce than that of earlier versions of Maple V, but it's generally worth the wait.

Also added are user-demanded features. Numeric functions can handle complex-value inputs and outputs, and minimax capabilities can be defined to work over finite ranges rather than the whole x -axis. More than a hundred new functions have been added to Maple V's libraries, and the handling of ordinary differential equations



Beautiful Equations The Nobel physicist P. A. M. Dirac called his life "a search for beautiful equations," but he never even got to see these gems in typeset-quality red on a Mac screen.

has been improved both algorithmically and in terms of solution representation. The statistics package now includes chi-square, t , and other distributions that were missing from earlier releases. Because of Maple's design, which uses a small kernel and libraries loaded only as needed, you can run Maple V on a 4MB PowerBook and use Microsoft Word at the same time—while the full version of Mathematica seems cramped running in 8MB of RAM.

The problem with Maple V, however, is that it hasn't garnered the level of external support that Mathematica has. Maple has libraries of functions contributed by users, but they are not comparable in scope to Wolfram Research's MathSource. The designers of Maple have licensed symbolic-computation capabilities into the numeric-math programs MathCAD and MatLab, but that still leaves Maple users typing in their own functions for a large assortment of common problems.

If you want access to a wider world of tutorials and preprogrammed solutions (and a bigger user group), Mathematica has a serious advantage over Maple. But if you prefer to do your own programming and function creation, you will benefit from Maple's efficient use of your Mac's resources, and version 3.0 hits most of the points on your symbolic-math wish list.

—CHARLES SEITER

Street Atlas USA 2.0

Geographical Information System

PROS: Fast searches and redraws; tremendous amount of data; fun. **CONS:** License limits practical applications; questionable accuracy; some interface foibles. **COMPANY:** DeLorme Mapping (207/865-1234). **LIST PRICE:** \$169.



STREET ATLAS USA IS A CD-ROM CONTAINING colorful, detailed maps of the entire United States. The maps not only label major highways, populated places, rivers, lakes, and mountains, but also show individual street names (with block numbers in large urban areas), airports, parks, and other points of interest. Using a variety of simple tools, you can explore the farthest reaches of the country while seated at your Macintosh.

When you launch Street Atlas USA, a map window and a floating toolbox fill the screen. The tools are self-explanatory, so there's little need to consult the 24-page *User's Manual*. You can begin by entering a telephone number, zip code, or city name to locate a particular section of the country. Thanks to efficient indexing, response time

is phenomenal even on slower Macs. After you find a location of interest, clicking on a button displays it in the map window. If you already know the approximate geographic location, you can zoom in by selecting the area of the map you want to see in more detail. Either way, the map window updates in seconds.

The license specifically prohibits use for "navigation, tracking, or any other purpose requiring exact measurements," nor may you "copy any screen display or map printout for publication, outside distribution, or sale in any form." You are allowed



Street-Level Mapping You can search Street Atlas USA by phone number, zip code, city name, or even by street-block number, in urban areas such as San Francisco.

to use Street Atlas USA as a "general visual reference" for planning trips, for example, but in my exploration of familiar areas I uncovered a number of inaccuracies, such as through-roads not connecting, railroads appearing where none exist, and towns missing or misplaced (Los Altos in Los Angeles County instead of Santa Clara County, for example). Other users have reported similar data-integrity problems.

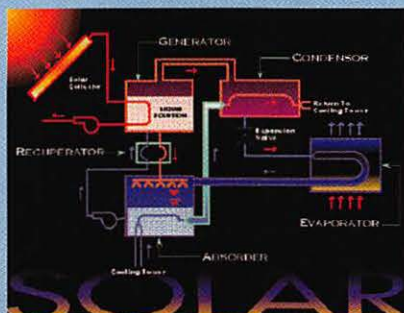
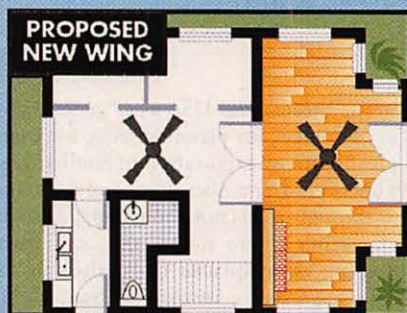
Street Atlas USA is DeLorme's first Mac product, and it shows in the Windows-inspired user interface. As mentioned, you can zoom in by selecting an area of the map, but the initial mouse-click always defines the upper left corner of the marquee. Also, if the area of interest lies just beyond the visible area of the map, you can't pan over with a hand cursor; instead you must click on a point where you want the map centered, or click on the appropriate button on the compass rose to jump a full screen in that direction.

It's hard not to like Street Atlas USA. For the most part, it delivers what it promises at a great price. Most troubling are the inaccuracies discovered in the data, but DeLorme pledges to fix all reported errors in subsequent annual updates. Despite its flaws, Street Atlas USA is a fun, relatively inexpensive, practical demonstration of the power of CD-ROM.

—OWEN W. LINZMAYER

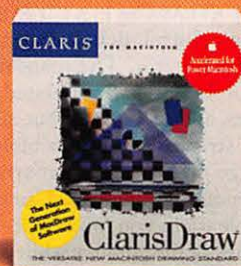
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Stop & Go 4.0

File-Protection/Relaunch Utility

PROS: In the event of a crash, fast restart or recovery of your Mac's desktop to resume work where you left off. **CONS:** Setup is unduly complicated; not compatible with Power Macintosh. **COMPANY:** Engram International (415/455-1100). **LIST PRICE:** \$69.99.



STOP & GO FROM ENGRAM INTERNATIONAL is designed to help prevent catastrophes caused by computer crashes—or just to allow you to quickly resume your work wherever you left off. It uses a portion of your hard disk to save a snapshot of the data in your Mac's RAM. This snapshot records loaded extensions, open applications, and all open disk and document windows. At preset times, Stop & Go updates the snapshot (somewhat like a program's autosave function, but in much more detail).

If your Mac crashes or shuts down (either because of power failure or because you've shut it down), Stop & Go uses the snapshot file to restore the Mac to the setup that was present when the snapshot was last updated. You set the updating (or marking)

interval; in addition to a time interval, you can also have Stop & Go update the snapshot after a fixed number of keystrokes or when you use a keyboard command.

A keyboard command (or clicking on the Stop button in the control panel) updates the snapshot and shuts down the Mac. The next time you start up, Stop & Go launches your applications and restores documents to the condition they were in when the snapshot was updated. If you crash and aren't able to activate the Stop process, you can restore your Mac's desktop by selecting the Go-Back option in the Stop & Go Panel desk accessory.

But this isn't as transparent as I would like. I'd prefer to see the Stop function integrated into the Mac's shutdown process and supported by a normal restart. (You can also set the Stop function to activate after a preset amount of idle time or at a specific time of day, such as at the end of your workday.)

Using the program's TurboGo feature, the whole restart process takes much less time than a normal start-up, application-, and document-launch routine. In my tests, starting up my PowerBook 540c took a little over two minutes from the start-up chord until I launched my first application and document. With Stop & Go re-creating my desktop, the process took just 45 seconds. More important, my documents were in precisely the same form as they were



Stop & Go Setup Use the Stop & Go Panel desk accessory to set the frequency of the updating process and when to stop (or shut down).

when Stop & Go marked my system during the shutdown process.

Stop & Go does its stuff with little fuss, other than a short delay (about 15 to 30 seconds) during the updating operation. Its interface could be made more transparent, though, and its thick manual is unduly threatening for a program that should be easy to use.

Some of Stop & Go's features duplicate the automatic-saving functions of other programs, and there are some programs, such as Now Utilities' SuperBoomerang and Connectix's CDU, that allow you to relaunch all open applications and documents when you restart. But Stop & Go is fast, and it relaunches everything in a single, unified process. Despite its few shortcomings, Stop & Go is definitely worth your consideration.—GENE STEINBERG

SuperScope II 1.25

Laboratory Data-Acquisition Software

PROS: Convenient; easy to use; strong data-analysis capabilities. **CONS:** Relatively small instrument library. **COMPANY:** GW Instruments (617/625-4096). **LIST PRICE:** \$1490.



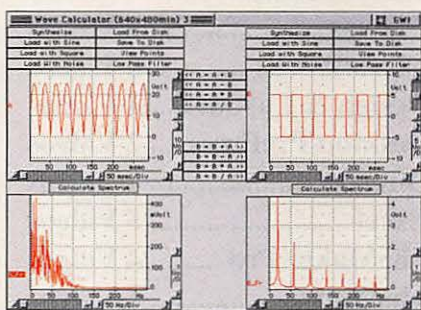
GW INSTRUMENTS' SUPERSCOPE II software is the natural partner of the company's MacADIOS II series of data-acquisition hardware. In case you're not a scientist, data acquisition means getting numbers (temperature, voltage, light intensity, and sound) from some outside source into a computer.

SuperScope II (which works with IEEE-488 and RS-232 devices, as well as GW Instruments' own boards) assumes that the instruments familiar to most working scientists are strip-chart recorders, X-Y recorders, and oscilloscopes (and with a spectrum analyzer also available as a sort of oscilloscope special case). Once you've set up your physical device so it's ready to produce data, you simply pick one of these options as your virtual instrument for on-screen display—the instrument also gives

you digital control of the acquisition hardware. Unlike National Instruments' LabView, for which a training course is a good idea (if not mandatory), SuperScope II can be set up in an afternoon by anyone who's ever used a storage scope—you simply follow the instructions in the manual.

Of course, the major advantage of on-screen instruments is that they display data that currently reside in your Mac's memory or on disk, so that postacquisition analysis is not just possible but easy. SuperScope II includes some basic, preprogrammed signal and waveform analysis. But its real analysis strength lies in an object library of functions for waveform math that includes windowing, filtering, convolution, arbitrary waveform generation, Fast Fourier transform, and more. Although it calls for a bit of icon-based programming on your part—SuperScope II Open also supports Symantec Think C source-code programming—you can set up your own virtual instrument that not only logs the input data stream but also performs real-time wave-manipulation functions on the stream in a separate window. On a Quadra 610, SuperScope II did this calculation on inputs running at thousands of sample points per second.

SuperScope II is less expensive than LabView, but it's a much smaller system: release 1.25 offers only 25 virtual instruments, while LabView offers nearly 500.



Waves, Not Surf Once you catch an input wave with a data-acquisition board, SuperScope II lets you open it in a virtual waveform calculator that offers a wide range of calculation types.

And whereas LabView supports all sorts of hardware platforms (including Sun and Windows) as well as a variety of programming languages—and lets you use National Instruments' huge assortment of data-acquisition cards—SuperScope II is a Mac-only system. Nonetheless, SuperScope effectively covers a wide range of laboratory needs (the MacADIOS cards can run 100,000 points per second at 12-bit conversion), and learning to use it won't become your life's work. If you're daunted by LabView's answer-for-everything approach, you may find SuperScope II to be a better product for your lab's data-acquisition needs.—CHARLES SEITER

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 FreeHand 4 Videos
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 Illustrator 4 Videos
 Infini-D 2 Videos
 Integrate Programs. 1 Video
 Lotus 1-2-3 3 Videos
 Macintosh 7.X 4 Videos

MacDraw Pro 2 Videos
 Mac P & L 3 Videos
 MacProject Pro .. 4 Videos
 MacWrite Pro..... 3 Videos
 MS Works 4 Videos
 Networking 1 Video
 Now Contact/
 Now Up-To-Date 1 Video
 PageMaker 6 Videos
 Peachtree Acctng.3 Videos
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Image Processing System

PROS: Unique mapping and map-distortion options; tool kit for easy application-interface building. **CONS:** Some non-Mac quirks. **COMPANY:** Research Systems (303/786-9900). **LIST PRICE:** \$1500.



ABOUT ONCE A YEAR, A MACINTOSH application appears that's shockingly powerful. IDL (Interactive Data Language) is a prime example. Using IDL on a not particularly energetic Friday afternoon, I managed to replicate the results of two years of programming that went into my Ph.D. thesis after spending less than a week exploring IDL's capabilities.

The developers had grappled with image-manipulation problems in geology, astronomy, and other sciences, before the Mac was a glimmer, so they were able to produce a compact, graphics-oriented, interpreted language in which a single command is worth a page of C-language code.

IDL assumes that you want to display two- or three-dimensional data and that a passive display of the data will fail to extract

the information you need. Thus IDL contains single commands that are the equivalent of Adobe Photoshop filters, commands for assessing image statistics, and commands for complex parametrization or reduction of images. Programs in IDL are usually concise enough that the program editor isn't a problem.

Two features of IDL speed custom application development. First, the function library is huge, allowing you to invoke most common statistical, matrix, convolution, color-table-graphics, geometry-warping, and image processing functions as basic commands. But Research Systems has also bundled the window-handling and interface elements (such as sliders, buttons, and scrolling lists) into a "widgets" package, so producing a real Mac application with a menu of image-manipulation functions, however specialized, is almost as easy as doing a "hello, world" program in MacApp.

Second, your application automatically ports to all Microsoft Windows and Digital Equipment VMS platforms, as well as to most Unix systems; however, some windowing operations seem to follow the Unix X-Windows model rather than the Macintosh custom. The set of programming examples is large enough to give IDL beginners (at least those at home in FORTRAN or C) a convenient place to start.

While IDL's ability to solve equations

and shade 3-D graphics is merely remarkable, the global mapping features are almost difficult to fathom. Because IDL has long been used to analyze satellite-collected data, it's uniquely suited to producing transformationally suggestive displays of the whole world. If, for example, you want a global map in which countries' sizes are expanded or shrunk according to GNP-per-capita data, you can do it easily in IDL.

IDL can also generate special-purpose programs to deal with medical images from different sources. That's the generous scope of this product. If you're an image processing professional, whatever your specialty, you should consider adding IDL to your tool kit.—CHARLES SEITER



NY, NY The Bronx is up and the Battery's down, but the inset picture of lower Manhattan can be sharpened, diluted, false-colored, and otherwise enhanced by individual IDL commands or by miniprograms of grouped commands.

Spectra-Com P192mx

Pocket Data/Fax Modem

PROS: Easy setup; decent performance; good telecommunications software. **CONS:** Unable to achieve 19.2-Kbps connections; poor status displays; so-so manual. **COMPANY:** Bay Connection (408/270-8070). **LIST PRICE:** \$199.95.



THE SPECTRA-COM P192MX FAX modem is a nice idea that could have been better executed. It was conceived to be used with a Mac notebook when no AC outlet is at hand. Designed for easy portability (if you have a large pocket), the modem weighs just over 5 ounces and comes with a handy carrying case. The Spectra-Com uses a 9-volt battery that provides up to two hours of power, and it comes with a regular 7V power supply for more conventional use.

The modem offers data-transfer speeds of up to 19.2 Kbps using V.32turbo (a subset of the V.32bis 14.4-Kbps protocol), as well as 14.4-Kbps faxing capability. It comes with Software Ventures' MicroPhone LT 2.0.1, which handles telecommunications

chores, and STF Technology's Faxstf 2.2.3 is included to send and receive faxes.

Setup is simple. Just plug your telephone cable into the Spectra-Com, connect the supplied hardware-handshake modem cable to your Mac, and turn on the modem. An LED flashes three times to indicate that the modem is working. (If the light continues to flash, it means you need to replace the battery.) If you expect to use the modem for more than two hours at a time, or you don't want to keep changing batteries, you should use the AC power supply instead.

Both the fax and telecommunications software use one-button installers and are easy to configure. MicroPhone LT offers a set of connection profiles for online services such as CompuServe and GENie. It also reads scripts created with one of the high-end versions of MicroPhone, but you cannot create your own scripts with this version. If a script isn't available, you must log on to a service manually. You also have the option of upgrading to either MicroPhone II or MicroPhone Pro.

The Faxstf software can handle most of your faxing chores, and it has a decent address-book feature. It's relatively transparent in most applications and quite easy to use. But it's not the latest version of the

program; my Power Macintosh crashed when I tried to use it. (STF Technologies claims that the free 2.6.1 update of Faxstf works with Power Macs; you can also upgrade to version 3.0, for an extra charge.)

The Spectra-Com modem was a decent performer but seemed to make connections a bit slowly. When I tried logging on to a BBS that supports 19.2 Kbps, I never got more than 12 Kbps. But 14.4-Kbps connections were not difficult to achieve. Besides the battery light, there are three LEDs that indicate normal modem activity, but the lights for sending and receiving are hard to see in a normally lit room.

The portable carrying case fits the modem just fine but provides no pouches for the cables. I got them in there, but I was unable to squeeze in a spare battery.

Technical support requires a toll call, but response was swift and well informed. The manual could use a little help, though; it lacked useful tips on setting up the Spectra-Com for best performance when logging on to an online service or BBS.

If you must have absolute portability, and AC power isn't available, the Spectra-Com P192mx pocket data/fax modem can do the job. My regular desktop modem, a Supra, is only a few inches longer and nearly as easy to transport (although it does require a nearby AC outlet).

—GENE STEINBERG

FontMixer 1.0

Font Utility

PROS: Provides an easy way to add characters to a font or change a keyboard layout.
CONS: Manual could use more detail; at small sizes, screen fonts not as legible as originals. **COMPANY:** Monotype Typography (312/855-1440). **LIST PRICE:** \$79.



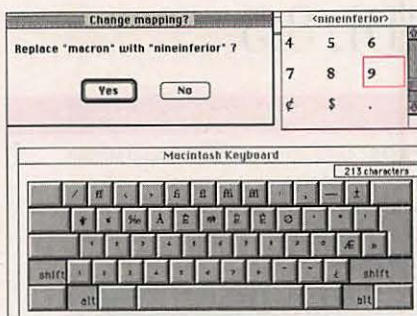
SOMEDAY, A SINGLE FONT WILL BE able to contain thousands of characters. (See "Inside QuickDraw GX Fonts," in this issue.) Meanwhile, a typical Macintosh font includes around 230 characters—not nearly enough for professional typographers. Monotype's FontMixer makes typesetting easier by letting you mix characters from different fonts to create a composite font.

Let's say you want to add fractions to a font. You first open the font with FontMixer, creating a base font. You then open a font collection with numerators and denominators for fractions. Now comes the hard part: you must find 20 expendable characters in the original font to replace with the numerators and denominators. Depending on your needs, you may be able

to substitute fractions for a row of shift-option accented characters or other characters you rarely use. (To place all the new characters together, you can use FontMixer to change the keyboard locations of any existing characters that are in the way; an on-screen keyboard shows the keyboard layout as you add, move, or remove characters.) If you have more expendable characters in the base font, you can add more characters or open another font and add characters from that. This system isn't perfect—you'll run out of replaceable characters sooner or later—but consolidating several fonts beats opening two or more fonts to type a limited set of special characters.

When you finish mixing your font, you select Make Font to create screen and printer versions of the new font. You must type in font and family names for the printer fonts (PostScript is very finicky about naming conventions, but the manual does a good job of explaining what is required) and ID numbers for the screen fonts. The naming-and-numbering procedure is a little scary for novices, but it's doable.

FontMixer then builds a new PostScript Type 1 font, which you install and use like any other PostScript font. I found FontMixer's screen fonts inferior to the original screen fonts at small sizes (accents didn't show up in the 12-point size, for example), but the display was generally good.



Adding Fractions Accented characters in Perpetua are being replaced with superior and inferior numerals for fractions. Several ornaments and extra ligatures have also been added.

Overall, I found FontMixer easy to use, although the documentation and interface could be more approachable. Users who purchase FontMixer from Monotype's Font-Fonts CD-ROM must contact their dealer or Monotype for a manual; a digital version of the documentation would be handy.

My main complaint is that, at \$79, FontMixer is a tad expensive for a one-trick program. Ares Software's \$149.95 Font-Monger, which also creates composite fonts, performs a number of other functions as well. However, if you simply want to add some characters to a PostScript font, FontMixer is a straightforward, relatively painless way to do it.—ERFERT FENTON

Extend+BPR 3.0

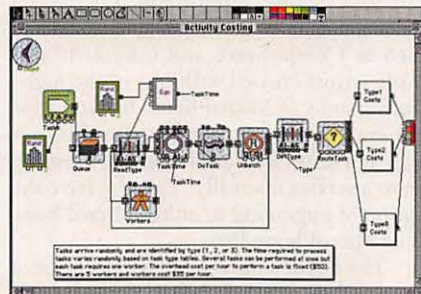
Business-Modeling Software

PROS: Superior set of templates for business-process reengineering; Extend engine fast at simulations. **CONS:** Difficult to implement without training; requires more than icon-based programming knowledge. **COMPANY:** Imagine That (408/365-0305). **LIST PRICE:** \$990.



REENGINEERING IS NOT JUST A business buzzword of the nineties; it's a shorthand designation for a process that should probably be going on all the time in all businesses. Simply put, it means examining day-to-day operations to find out how a business can deliver more of what its customers want, instead of delivering more of what a company's internal regulations demand. Extend+BPR (Business Process Reengineering) combines the popular Extend simulation software with a predesigned set of reengineering examples to cover a spectrum of business functions. It provides templates corresponding to an assortment of business models; the models are easy enough to understand but often require considerable background data.

For example, you construct a model in Extend+BPR by connecting icons that represent steps in a business process. In the activity-costing template you decide on a schedule of tasks (the program assumes that tasks arrive randomly—you pick a rate) and follow them through all stages to completion to determine how many employee hours are involved in accomplishing the tasks and what the internal accounting charge for the tasks should be. You can assign different categories of costs (materials, labor, overhead) and open the Extend+BPR icons to assign times for standard tasks. This model is sufficiently general to accommodate not just business-as-usual processes, but random tasks that logjam all the normal task-handling channels.



Time after Time Extend+BPR's Activity-based costing template can show a business where the money really goes in processing orders.

Extend+BPR also includes templates for strategic planning, production, invoice/approval scheduling, finance, process and workflow routing, and activity costing, plus it offers lots of advice on customizing the templates. In theory you could take this package and design a set of realistic business models to guide a firm in process reengineering. In fact, however, there's no point in attempting it unless you understand the characteristics of different distributions of random variables and are familiar enough with C or Pascal to deal with the data structures (sets of variables, input tables, output graphs) behind the Extend icons.

A more substantial obstacle to the effective use of Extend+BPR is the daunting amount of business data you must gather. Still, just collecting the data to make a realistic model frequently highlights inefficient processes, whether or not the data is used in a proper Extend business simulation.

The templates in Extend+BPR can help a company decide which processes absolutely must be carried out sequentially and which can be conducted concurrently for better results in less time. That alone helps this package pay for itself. The only caveat is that a company attempting to reengineer via Extend needs a dedicated team of workers who have some background in programming and who have unlimited access to operational data.—CHARLES SEITER

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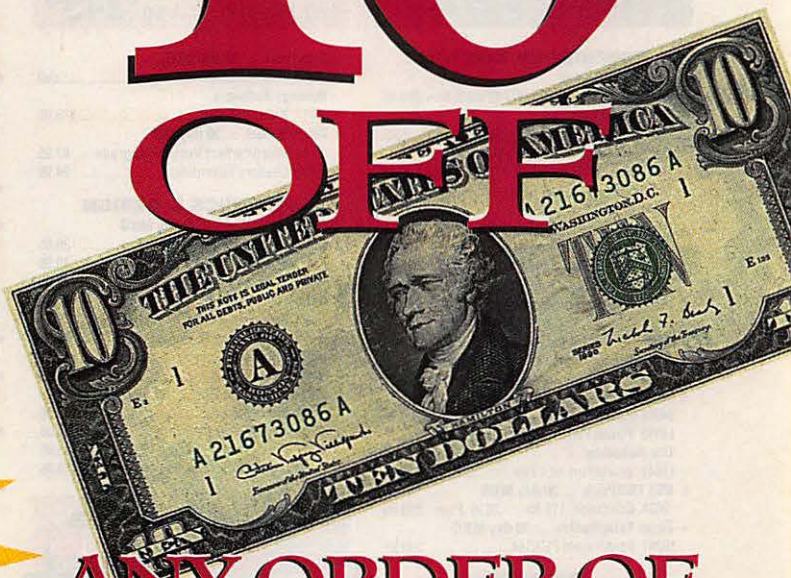
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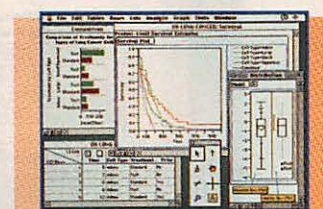
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ReadySetGo 6.0.2

Desktop Publishing Software

PROS: High-end features; low price. **CONS:** Awkward interface. **COMPANY:** Manhattan Graphics Corporation (914/725-2048). **LIST PRICE:** \$395.



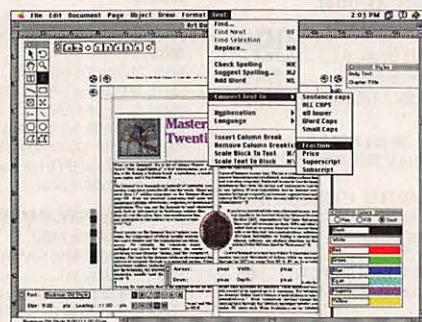
IT'S BACK—AFTER SEVERAL YEARS OF languishing with Letraset USA, ReadySetGo's original developer, Manhattan Graphics, has regained control over its page-layout program and given it a major revision, to boot.

So who in the world needs an alternative to Aldus PageMaker and QuarkXPress? Not a lot of entrenched publishers, but ReadySetGo's \$395 list price will no doubt make it attractive to Macintosh newcomers who think the competitors' \$895 price is too steep.

Is the low price going to be enough to give ReadySetGo a chance to reenter the market in a big way? Perhaps. The product itself falls midway between PageMaker and QuarkXPress, offering the manual approach of PageMaker and the precise controls of QuarkXPress. For example, cre-

ating multiple-column documents means laying out each column and then flowing the text between them. That's similar to PageMaker. On the other hand, you can have ReadySetGo format fractions and automatically create a nonrectangular wrap that fits an image's shape. That's similar to QuarkXPress.

All in all, ReadySetGo offers a strong set of tools for color publishing (trapping and multiple color models) and for typography (fine levels of control over tracking, character styling, and hyphenation). Its layout features are weakened by its inability to link multiple columns, but there are many tools for creating objects of various shapes



Confusing Interface ReadySetGo offers a full set of professional publishing tools, but its interface is confusing because of the many palettes and non-standard ways of interacting with them.

and creatively mixing text and graphics. If you're producing manuals or technical documents, you'll be disappointed; there are no indexing or table-of-contents tools, and page-numbering options are limited (no footers or headers).

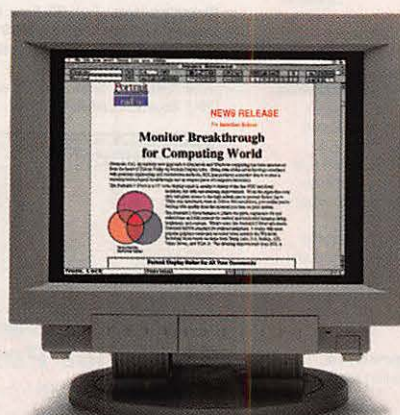
Despite its well-rounded set of features and its low price, I can't really warm up to ReadySetGo. What makes me keep my distance is the interface. It's clunky and unintuitive. You must constantly switch between tools—the one that selects a text box won't let you import text into the box, for example. The mouse never rests. The menus are also oddly organized, and I don't think it's a question of just being different from PageMaker or QuarkXPress—it's a question of being jumbled.

I also find the palettes to be too large and their text too small—they're hard to read, and there's no standard Macintosh feedback when you try to select a setting to change it. (The text doesn't get highlighted so you can replace it; instead, you must pick an insert point and delete or add to the text-size values.) The manual likewise has a thrown-together feel.

There's no strong reason not to use ReadySetGo if its tools match your needs. But there's really no compelling reason to choose it over the competition, either. A low price is nice, but it's not enough.

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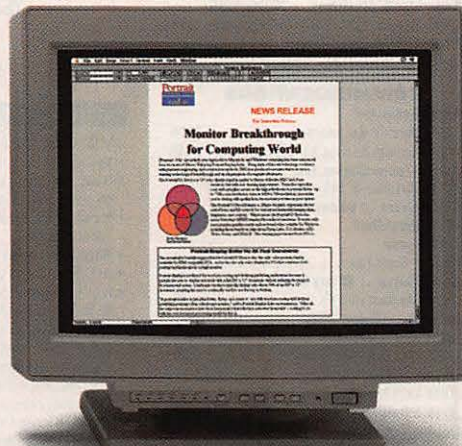
Typical 17" monitor

\$1,100



Portrait/15 Pivot

\$799



Typical 20" monitor

\$2,100

Crystal Ball 3.0

Business Simulation Software

PROS: Convenient Excel integration; sensitivity charts can highlight key model features.

CONS: Performance now slower on small simulations. **COMPANY:** Decisioneering (303/292-2291). **LIST PRICE:** \$295.



ONE MAJOR PROBLEM WITH spreadsheets is that they encourage users to forget that the numbers they display, particularly in projections of sales or future budgets, represent hopes and dreams or just plain wishful thinking. Crystal Ball lets you calculate forecasts with distributions rather than single numbers, so that you can see Sales Next March as an uncertain quantity that is likely to fall in a range, rather than, say, a solid, definite \$125,000.

For most business purposes, this means that a Crystal Ball-Microsoft Excel calculation gives you a bottom line that's a distribution rather than a single number.

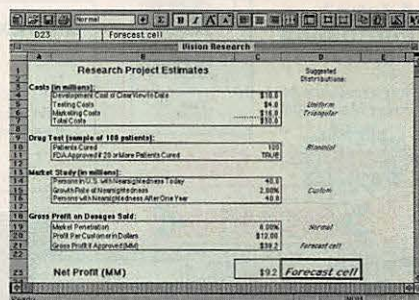
Setting up a Crystal Ball model that corresponds to this reality is quite straightforward. You assemble your model in traditional style, connecting cells with Excel

formulas. You then define assumption cells in the model by attaching distributions to single numbers with a click on the distribution icon in the new tool bar. For forecast cells, Crystal Ball presents output graphs giving forecast distributions, crunched through your formulas by Monte Carlo simulation of the assumption distributions. Even simple business models, when studied correctly with a simulation, turn out to be full of surprises. Businesses frequently find that potential cash-flow problems are easier to anticipate in a distribution-based model than in a standard spreadsheet.

Crystal Ball 3.0 adds sensitivity charts, which let you pick the most significant variables from a complex model—once your model contains more than a half-dozen assumption distributions, you really need this feature. New distributions in version 3.0 include Pareto, logistic, extreme-value, and gamma; since the gamma distribution can model a wide variety of other distributions as limiting cases, its addition is a major extension. The new distributions, chart types, and views simply appear as icons on the tool bar or as choices in dialog boxes. In fact, the only downside of the new interface and feature set is that small models (10K to 30K) now labor under the massive overhead of Excel itself. For large models this overhead won't be noticed, as the computation time itself dominates; for small

models there's a burst-mode option that ameliorates the speed problem somewhat.

Crystal Ball's only real competitor is Palisade Corporation's (607/277-8000) \$395 @Risk, which offers a few more probability distributions than Crystal Ball but has a less intuitive interface. For most purposes, business analysts will find Crystal Ball more convenient to use—directing all the action from the Crystal Ball tool bar makes the statistical approach to calculations a natural extension of spreadsheet use. At this point Crystal Ball works only with Excel. Crystal Ball is compact, it's fast enough for complex projects, and it can pay for itself in disaster-avoidance in a large variety of common business tasks.—CHARLES SEITER



Looking Ahead This Crystal Ball simulation estimates possible profits from a research project, using distributions to model the success rate in the project and the number of possible customers.

page without scrolling, shrinking, or the Portrait/15 Pivot makes sense.

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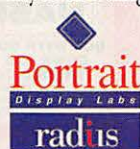
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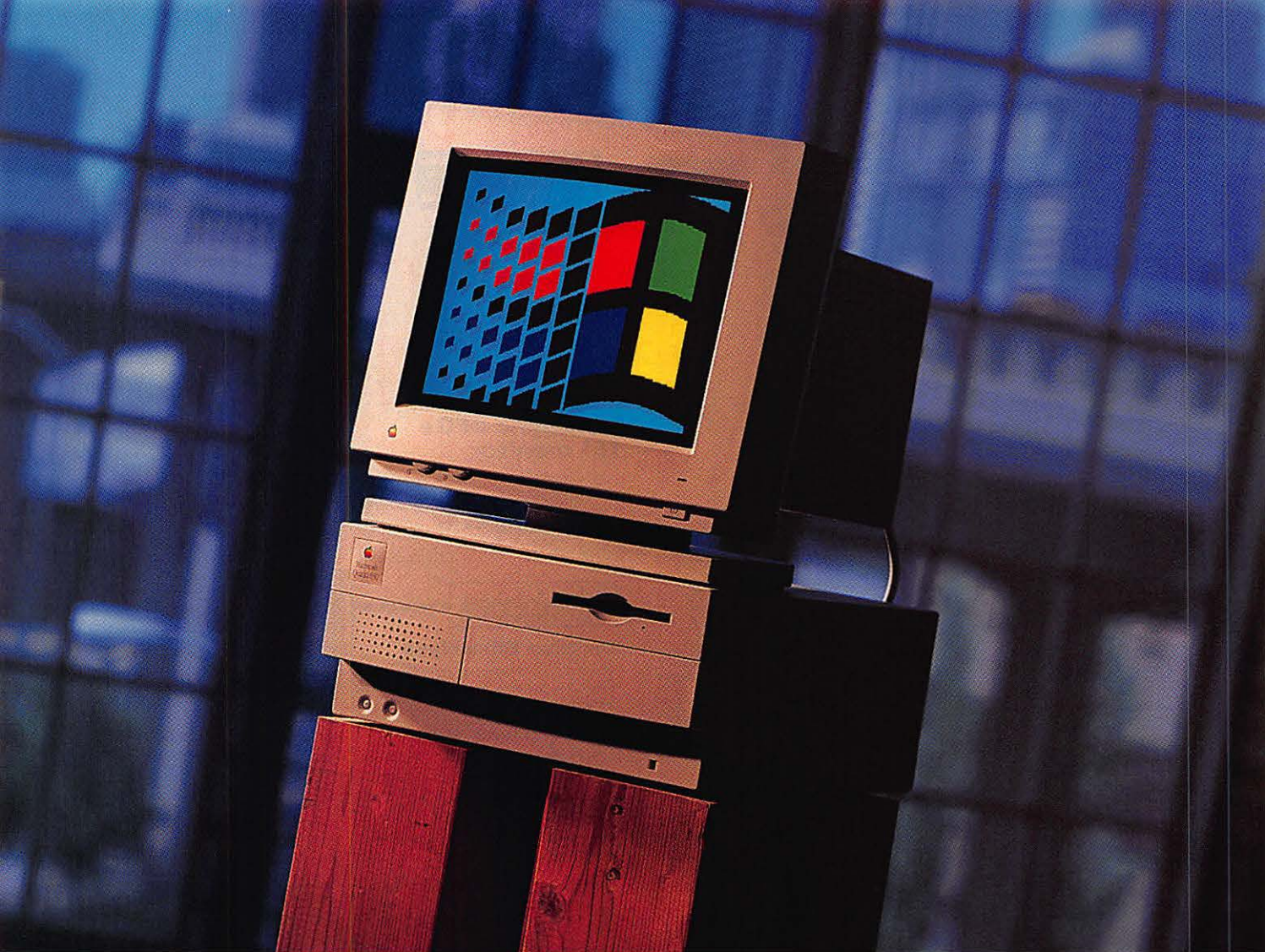
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The Mac Does

YOUR COMPANY HAS JUST STANDARDIZED on a database program that's available only for Windows PCs, and you're now being forced to part with your Mac because it's not compatible. Or you're a Mac-based service bureau that would like to tap into the Windows market while retaining Macs as your primary workstations. Or you use a Mac at the office and you'd like to bring work home, but your spouse already uses a Windows PC at home and you don't have the room or money for two computers.

If any of these scenarios describe your situation, take heart. While you've had the ability to run Windows applications from a Macintosh for a few years now, for the most part it's been an awkward, slow, and expensive compromise. Finally, you've got several choices for having your

Macintosh and running Windows, too.

- Orange Micro's OrangePC Model 200 series of cards (714/779-2772) let you run Windows via an add-on NuBus card that contains a miniaturized PC motherboard. (Apple Computer discontinued a similar product, its DOS Compatible Card for Quadra/Centris 610, only two and a half months after it began shipping in early April. Apple says it may have similar products in the future for other Macs, however, and has recently demonstrated a 50MHz 80486DX2-based prototype card for Power Macs. See *Reviews, Macworld*, June 1994, for a comparative review of Apple's card.)

- Insignia Solutions' SoftWindows 1.0 (415/694-7600) provides Windows on a Power Mac via emulation. (Its SoftPC 3.1 program for 040-based Macs does, too,

WHAT'S THE BEST WAY TO TURN YOUR MAC INTO A PC? FIND OUT IN THIS MACWORLD LAB REPORT

but it's much too slow to consider.)

- Farallon Computing's Timbuktu Pro 1.0.3 for Macintosh and Timbuktu 1.1 for Windows (510/814-5000) let you run a Windows PC over the network from your Mac. (We tested Timbuktu Pro 1.0 for the Mac, but Farallon says there is no performance difference.)

Each approach has its pros and cons, as this article shows. To help you decide which is right for you, Macworld Lab tested all the Windows options against a range of standard business Windows PCs based on 80486 and Pentium CPUs to show you exactly what kind of performance you can expect running Windows on your Mac. The results appear in the benchmarks "Are Windows Macs Good Enough?" We also gauge how interoperable each Windows option is with other PCs and the Mac.

Which Will Work on Your Mac?

The first question to ask yourself is which Windows options are available for *your* Mac. Some Mac owners have only one choice if they want to run Windows, since

Windows on any Mac, although it does require having a PC in the office.

How Much Speed Do You Need?

The second question you should ask yourself is how much Windows performance you require.

If you need Windows to run, say, Microsoft Access to get employee payroll information for a report you do once a week, you don't need to spend a lot on performance. A product that offers the speed of a slow 80486SX-based PC (equivalent to a Quadra 605) or of a fast 80386DX PC (equivalent to a IIfx) is enough for occasional use. To get this level of performance, any of the products reviewed in this article will suffice. But note that these speeds are bottom-of-the-line for business PCs, and software will continue to demand more speed as new versions are released.

If you need to run specialized Windows programs—such as scientific-analysis, relational-database, accounting, or in-house custom software—look for an option that provides high performance,

Windows

not all of the products that offer Windows on a Macintosh work on every Mac.

- The OrangePC cards work on any Mac with a 12-inch NuBus slot: all the Macs in the II series (except the IIsi); the Centris 650; the Performa 600; the Power Mac 7100 and 8100; the Quadra 650, 700, 800, 840AV, 900, and 950; and the Workgroup Server 80, 8150, and 9150. The OrangePC software works in native mode on both 680X0 and PowerPC Macs.
- SoftWindows works only on a Power Mac, and Insignia recommends that a 256K or larger cache card be installed. (A 256K card's price ranges from \$199 to \$299, depending on vendor. A Power Mac 8100 includes a 512K cache card.)
- Timbuktu Pro works on any Mac that's linked to PCs via a LocalTalk or Ethernet network. It's the one surefire way to get

at least equivalent to a 33MHz 80486DX-based PC. You wouldn't run these programs on a slow PC, so don't run them in a slow Windows environment on your Macintosh.

The options for fast Windows performance are more limited: you'll want one of Orange Micro's OrangePC cards or Timbuktu Pro running on an 040-based Mac controlling a 33MHz or faster PC on the network. (Timbuktu running in 680X0 emulation on a Power Mac is no faster than on an 040-based Mac.)

OrangePC The OrangePC cards won't give you quite the full speed that their CPUs are capable of, as Macworld Lab tests show. For example, in our core tests a Model 290 using a 66MHz 486DX2 performs about midway between a 33MHz 486DX PC and a 66MHz

by Galen Gruman

486DX2 PC. And it's actually slower than a 33MHz 486DX PC—80 percent the speed—when tested with Windows-only programs. (A 66MHz 486DX2 system should be about 150 percent as fast as a 33MHz 486DX system.) Overall, an OrangePC card performs about the same as the next-slowest equivalent PC: a 100MHz card's performance is similar to a 66MHz PC's, a 66MHz card is equivalent to a 33MHz PC, and a 33MHz card is like a 25MHz PC.

The slowdown is due in part to the overhead that Orange Micro's scheme for shared video, disk access, and input devices requires. In addition, the OrangePC cards' VGA video-controller chip is only a middling performer, and when running in 256 colors, this chip affects the video component of overall performance. (The Model 210 runs only in 16 colors.)

For the Model 210 and 250, a big part of the slowdown is the lack of an on-board cache, which almost every desktop PC includes to boost performance. You can see the difference this makes by comparing our results for the Model 290 and the cacheless Model 250 when using the same 66MHz 486DX CPU.

On Power Macintoshes, we noticed a slight performance drag—just a few percentage points—even though the OrangePC software contains both 680X0 and PowerPC code.

Because you can upgrade the CPU on the OrangePC cards simply by removing the current one, adding a faster one, and changing some jumpers, the OrangePC cards give you the option of increasing your Mac's Windows performance

later. But expect to wait a year before you'll find 486DX2 or IntelDX4 CPUs on sale without a PC motherboard attached. And don't expect to be able to plug in a Pentium.

SoftWindows On a Power Mac 7100/66 with a 256K cache card, you'll get the performance of only a 40MHz 386DX-based PC (120 percent as fast as a IIfx, or about 75 percent as fast as a 25MHz 486SX-based PC or a Quadra 605). Note the inclusion of a cache on the 7100. Insignia recommends a cache for good reason—Macworld Lab tests show that the cache lets SoftWindows run a little faster than SoftWindows on a 7100 with no cache (110 percent as fast).

Still, even on an 8100/80 (which comes with a 512K cache), SoftWindows is slower than any other option, maxing out at about the speed of a 25MHz 486SX (or Centris 610). Performance on a 6100/60 (with no cache) is equivalent to a 33MHz 386DX (or IIfx).

Although SoftWindows has huge memory requirements—you need a system with 16MB of RAM—adding more memory won't speed up SoftWindows' performance noticeably, according to Macworld Lab tests. As with the Mac, Windows performance levels off after a certain RAM level; extra RAM doesn't boost speed but does let you run more applications simultaneously. Having 16MB of Mac system memory leaves just 6MB for Windows, with the SoftWindows software itself taking another 9MB to run its emulation code. (That leaves 2MB for the Finder.) The 6MB for Windows gives you enough room to

run a couple of modest Windows programs (such as Lotus 1-2-3 and Borland International's Paradox) simultaneously.

The key to good SoftWindows performance is to configure the DeltaCache for at least 2MB of RAM when setting up your PC Memory in the Setup menu. This cache resides in your Mac's memory and helps SoftWindows keep common Windows functions readily available.

Aside from its performance issues, SoftWindows also has a significant functional limitation: it runs only in Windows Standard Mode, not in Enhanced Mode. (Enhanced Mode lets programs take advantage of features in the 80386 and later Intel CPUs, and thus requires such a CPU; Standard Mode requires only a 286 CPU and exists for backward compatibility with the fast-diminishing pool of 286-based PCs. Because SoftWindows' emulation is based on the 286 CPU, it supports only Standard Mode.) Windows programs designed to run in Windows Enhanced Mode (for example, Frame Technology's FrameMaker 4.0, Borland's Paradox 4.5, Adobe Photoshop 2.5.1, and Novell's WordPerfect 6.0) won't run under SoftWindows. And you can expect more and more applications in the coming months to require Enhanced Mode. Without Enhanced Mode, SoftWindows also can't run multiple DOS sessions.

Insignia promises to revise SoftWindows by the end of the year with at least some Enhanced Mode capabilities—a four-month delay from its original plans. That's pretty late to be offering this capability, especially when Microsoft is likely to ship its forthcoming new version 4.0

Calculating the Real Cost of Windows

All prices reflect direct prices or street prices and may vary by region. Configurations assume 8MB of RAM and 240MB hard drives each for the Mac and Windows environments.

	OrangePC Model 210	OrangePC Model 250	OrangePC Model 290	SoftWindows	Timbuktu
Basic Setup					
Product cost	\$1139 (33MHz 486SX), \$1283 (33MHz 486DX)	\$1663 (33MHz 486SX), \$1807 (33MHz 486DX)	\$2403 (66MHz 486DX2), \$3237 (100MHz DX4) ¹	\$350	\$290 ²
Windows 3.1	\$75	\$75	\$75	Included	\$0 (on PC)
Extra RAM	\$175 (4MB)	\$0 (none needed)	\$0 (none needed)	\$600 (8MB of RAM plus 256K cache)	\$0 (on PC)
240MB hard drive	\$300	\$300	\$300	\$300	\$0 (on PC)
Network card	\$200	\$300	\$300	\$0 (none needed)	\$180 (Mac transceiver plus PC card) ³
Total	\$1889 to \$2033	\$2338 to \$2482	\$3078 to \$3912	\$1250	\$470 ³
Complete System					
Basic setup costs	\$1889 to \$2033	\$2338 to \$2482	\$3078 to \$3912	\$1250	\$470
Macintosh	\$3300 (Power Mac 7100) ⁴	\$3300 (Power Mac 7100) ⁴	\$3300 (Power Mac 7100) ⁴	\$3300 (Power Mac 7100)	\$2500 (Quadra 650)
Windows PC	\$0 (not applicable)	\$0 (not applicable)	\$0 (not applicable)	\$0 (not applicable)	\$1800 (486DX2 PC)
Total	\$5189 to \$5333	\$5638 to \$5782	\$6378 to \$7212	\$4550	\$4770 ³

¹ = Runs in native mode on a Power Macintosh. ² Includes 16MB of RAM. ³ For one Mac and one PC. ⁴ Add \$150 for Ethernet. Add \$175 for Personal MacLAN Connect. ⁵ \$2500 for a Quadra 650.

Windows may look superficially like the Macintosh interface, but there are a number of differences that can throw a veteran Macintosh user working for the first time in a cross-platform environment. If you are puzzled by how Windows works, use this guide to translate common Mac operations to their Windows counterparts. In the accompanying screen images, common interface elements that

differ significantly between the Mac (top) and Windows (bottom) are highlighted and numbered to match the text here.

I also recommend a good book to ease the pain: Steve Lipson's *Windows as a Second Language* (Sybex, 1994, \$17.99). It does a great job explaining Windows concepts from a Macintosh point of view.

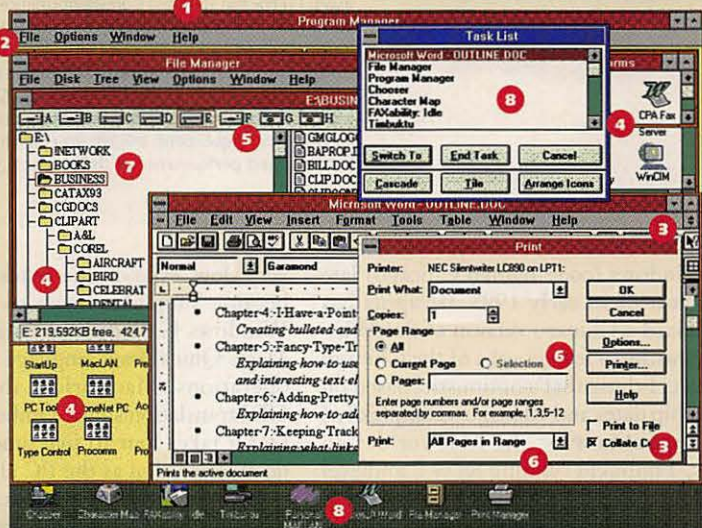
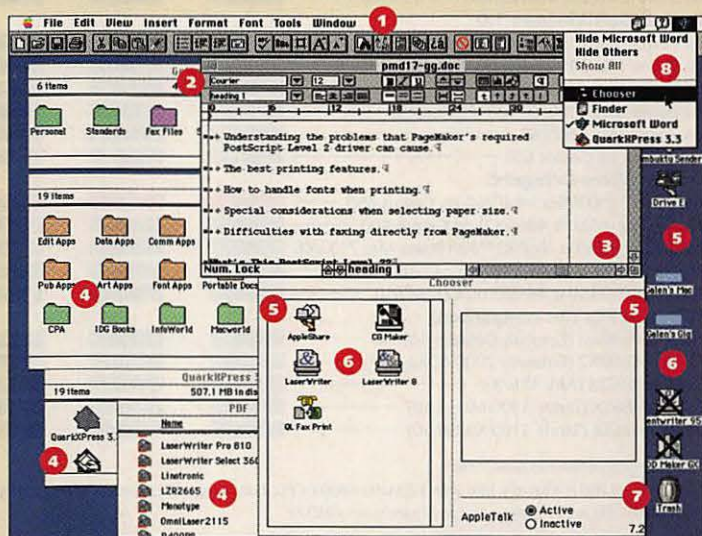
1. Windows menus work like Mac menus, except that you don't have to hold the mouse down to keep the menu visible. Just click on a Windows pull-down menu and the menu remains on screen until you click on something else.
2. Windows has two types of close boxes, called close handles. They look similar to file-drawer handles. The wider one exits a program; the narrower one closes the current document.
3. To resize a Windows window, select any part of the window border and hold down the mouse while dragging. At the corners, you can resize the window horizontally and vertically at the same time. There are more controls in the upper right corner, similar to the Mac window's single control to toggle between full size and the last user-defined size. Clicking on the up-triangle icon (called Maximize) causes the Windows window to fill the screen; the dual-triangle icon (Restore) makes the window the last user-defined size; and the down-triangle icon (Minimize) reduces the window to an icon. A minimized program is still running, but in the background. If you minimize a document, its icon usually appears at the bottom of the program window.
4. The Mac's folder structure lets you place documents, programs, and folders inside folders. The placement of these elements in folders matches the physical location in the Mac's internal disk map. Windows uses DOS's disk map, which is a hierarchy similar to the Mac's but is unlike the flat Windows structure. Use the File Manager program as you would the Mac's Finder to manipulate the hierarchy of files and folders. In the Program Manager (the Windows interface), you have windows called program groups. Unlike Mac folders, they can't contain other folders. And they can only contain documents if you drag them from the File Manager into the group. The icons in groups are like aliases on the Mac—they aren't the actual files, just references to them. Thus, deleting, copying, or moving an item in a group does not delete, copy, or move it from the disk—you need to use the File Manager (or DOS) for that.
5. Windows displays all volumes in the File Manager, with different icons for hard drives, removables (including floppy drives), network drives (servers), and CD-ROM drives. You use network-

management software to connect to a server; there's no equivalent to the Chooser for this (although Farallon Computing uses the name Chooser for its Windows LocalTalk network manager).

6. Windows doesn't use a mechanism like the Chooser to change printers. Instead, you change the printer from a program's Print dialog box or from a separate Printer Setup dialog box (some programs support both methods). (You set the default printer via a control panel.) As on the Mac, you can drag and drop files onto an icon (in Windows, it's the Print Manager icon; on the Mac, it's your printer's icon) to initiate printing.

7. To delete an icon in the Program Manager or a file or folder in the File Manager, press the delete key. Windows has no Trash Can, except in third-party interface-enhancement software (the equivalent of system extensions).

8. Windows uses something called a Task Manager, which you access via Ctrl-Esc, to switch among open programs—similar to the Mac's program pull-down menu. You can also simply double-click on minimized programs from the bottom of the screen.



(This also doubles as the equivalent of the Mac's Apple menu.) But if you switch from one program to another, the one you switched from is not automatically minimized. There is no Windows equivalent for hiding a program.



Are Windows Macs Good Enough?

WINDOWS APPLICATION INDEX

Times as fast as a 33MHz 486DX PC (486DX = 1.0).

Use these results to compare the performance of systems for popular Windows programs not available on the Mac that a Mac owner may want to use.

CORE-PERFORMANCE INDEX

Times as fast as a Classic (Classic = 1.0).

Use these numbers to compare any Mac or Windows PC.

Best result for a Mac product in each test suite. Products are grouped by vendor (and arranged in that group in order of overall Windows performance), followed by a group of PCs to be used as points of comparison.

	Overall	Aldus Info Publisher 2.0	Lotus Ami Pro 3.01	Lotus 1-2-3 4.01	Microsoft Access 1.1	Common	Scientific
Apple DOS Compatible Card*	0.5	0.6	0.7	0.2	0.6	11.9	12.7
Farallon Timbuktu Pro 1.0							
on 33MHz 486DX PC from Centris 610 (LocalTalk)	0.6	0.7	0.6	0.5	0.7	11.6	31.8
on 33MHz 486DX from Centris 610 (Ethernet)	0.6	0.7	0.5	0.3	0.7	11.0	31.1
Insignia SoftWindows 1.0							
on Power Mac 8100/80 (includes 512K cache)	0.4	0.4	0.6	0.4	0.4	8.6	14.4
on Power Mac 7100/66 with 256K cache	0.3	0.3	0.4	0.3	0.3	7.8	13.0
on Power Mac 7100/66	0.3	0.3	0.5	0.3	0.3	6.5	10.0
on Power Mac 6100/60 with 256K cache	0.3	0.3	0.3	0.3	0.3	5.9	10.6
on Power Mac 6100/60	0.2	0.2	0.2	0.2	0.2	5.0	7.4
SoftPC 3.1 on Centris 650	0.1	0.1	0.1	0.1	0.1	1.6	2.8
Orange Micro OrangePC							
Model 290 (100MHz IntelDX4) on Centris 650	1.4	1.5	1.8	0.9	1.5	27.4	79.0
Model 290 (66MHz 486DX2) on Centris 650	0.9	1.0	0.6	0.8	1.0	19.6	55.7
Model 250 (66MHz 486DX2**) on Power Mac 7100/66	0.8	0.8	0.9	0.7	0.7	16.3	44.2
Model 250 (66MHz 486DX2**) on Centris 650	0.8	0.8	0.9	0.7	0.7	16.5	44.1
Model 210 (33MHz 486SX) on Centris 650	0.6	0.8	0.8	0.2	0.6	12.9	14.1
Windows PCs (for comparison)							
60MHz Pentium (Compaq Deskpro 5/60M)	2.0	2.4	2.0	1.5	1.9	31.2	89.5
66MHz 486DX2 (Gateway 2000 4DX2-66V)	1.5	1.6	1.7	1.4	1.3	23.0	62.1
33MHz 486DX (AMI 486/33)	1.0	1.0	1.0	1.0	1.0	15.5	36.3
33MHz 486SX (Tandy 3100 Model 10)	0.8	0.9	0.9	0.3	0.9	16.0	16.6
25MHz 486SX (Tandy 3100 Model 10)	0.6	0.9	0.6	0.2	0.6	12.1	12.6

*Product discontinued in June 1994.

**The Model 250 is normally sold with a 33MHz 486DX CPU, but Orange Micro provided this configuration instead. To get this configuration would require the owner to replace the 486DX CPU with a faster, separately purchased 486DX2.

BEHIND OUR TESTS

Macworld Lab compared Windows performance in two ways: (1) For the standard Core-Performance Index, we performed identical tests in two programs available for both Windows and the Mac (Microsoft Word and Microsoft Excel). This method lets you compare the performance of any Mac and any Windows PC. (2) We performed tests using popular Windows programs that have no Macintosh equivalent; this lets you directly compare the Windows performance of the products we tested.

Both sets of tests exercise components of PC performance: integer (standard) computation, disk access and system overhead, video display, and floating-point computation. The results give a balanced view of overall performance. All systems were tested with 16MB of total RAM and in 256-color, 640-by-480-pixel resolutions—except for the OrangePC Model 210 card, which supports only 16 colors.—**Macworld Lab testing supervised by Danny Lee and Galen Gruman**

of Windows (code-named Chicago) late this year or in early 1995. (Insignia has promised a Chicago version of SoftWindows within a few months of the Chicago release. I think that's optimistic, based on past ship dates and Chicago's complexity.)

Timbuktu Pro In Macworld Lab tests, Timbuktu running on two midlevel computers—a 33MHz 486DX-based PC and a 20MHz 040-based Centris 610—performed at about 25MHz 486SX PC (or Quadra 605) levels.

The faster your PC-based Windows server, the faster the performance you'll get for calculations and disk access. But video performance—everything from scrolling to window display—will seem

very slow, even on the fastest PC. That's because Timbuktu needs to translate the Windows GDI display language to the Mac's QuickDraw language for all video operations. Macworld Lab found that GDI translation slows Timbuktu so much that it takes four to five times as long to do an operation as the PC alone would.

Having a high-performance video card on the PC won't increase video-display speed from the Macintosh user's perspective—the Mac still has to wait for the GDI information to be translated to QuickDraw. As a result, the more video-oriented your work, the slower Timbuktu is. Conversely, the less video-oriented your work, the faster Timbuktu is.

Farallon recommends using a fast Mac to increase the GDI-to-QuickDraw translation. However, our testing found that using a Quadra 650 (which uses a 33MHz 040) rather than a Centris 610 (which uses a 20MHz 040) made almost no difference in video performance on a LocalTalk network. But changing from a 33MHz 486DX PC to a 66MHz 486DX2 PC made a dramatic difference: video-processing speed increased 50 percent. Clearly, it's Timbuktu for Windows that's responsible for most of the GDI-to-QuickDraw processing.

Don't assume you can get better performance by using a Power Mac: running in 680X0 emulation, the speed for GDI-

to-QuickDraw translation is about the same as on a 040 Mac. (Make sure you use Timbuktu Pro 1.03, since version 1.0 did slow down Windows performance noticeably on Power Macs.) Farallon plans to include native Power Mac code in the next major release of Timbuktu Pro, expected later this year.

You might think that the network you use would make a performance difference,

prices, because list prices don't account for the price of RAM requirements and other components. The table "Calculating the Real Cost of Windows" shows the actual costs of a typical business setup; use this table to calculate your own expenses.

Clearly, Timbuktu Pro is the least expensive option—if you already have a PC to network to your Mac. SoftWindows follows closely—if you happen to own a

port PC CD-ROMs, although you usually need to install the (supplied) driver in DOS. All support printing to PostScript and non-PostScript printers, although the Mac will need the appropriate driver for non-PostScript printers.

OrangePC The OrangePC software lets you establish a shared drive or folder for exchanging data between Mac and Windows programs. OrangePC can also

Clearly, Timbuktu Pro is the least expensive option—if you already have a PC

with Ethernet performance being faster than that of LocalTalk (as it normally is). But it turns out that, for most Macs, the GDI-to-QuickDraw processing essentially limits the transfer of video data from the PC to the Mac to LocalTalk speeds. As a result, there's little reason to install an Ethernet network to use Timbuktu Pro—go ahead and use a cheaper LocalTalk network.

Timbuktu works on a PC by installing AppleTalk networking drivers in DOS's 640K of conventional memory, a technique that can cause difficulties. For one, that leaves only slightly more than half of the memory for other programs: barely enough to load Windows, one program that runs under Windows, and a few drivers. Expect to tweak your DOS setup considerably to get a Windows PC running Timbuktu comfortably, since the setup does not take maximum advantage of DOS's memory-handling features. (Two tips: Load drivers into high memory whenever possible. And load the network software after other drivers.)

Also, because Timbuktu loads the AppleTalk drivers into DOS, compatibility with the next version of Windows—which won't require the use of DOS—is questionable. However, Apple is developing Windows-based AppleTalk drivers, which it will license to Farallon, to provide support for AppleTalk under the DOS-less version of Windows.

What Is the Real Cost?

The third issue to consider is how much money you can afford to spend.

The list prices for products that let you run Windows on Macs are all over the map—from \$199 for Farallon Computing's Timbuktu Pro to \$3237 for Orange Micro's OrangePC Model 290 with a 100MHz IntelDX4 CPU. But those costs don't tell the whole story. In fact, the true costs are more than the list

Power Mac. The OrangePC cards are the most expensive options—they cost several hundred dollars more than a complete Windows PC—but you get a full-fledged PC integrated into your Mac. (Orange Micro does offer discounts of about 10 to 15 percent for volume purchases.)

But the whole-system costs don't show such dramatic differences: the SoftWindows, Timbuktu, and OrangePC Model 210 systems all cost within a few hundred dollars of each other.

How Interoperable Are They?

The fourth question to ask—whether you work alone or in a networked office—is how well your Macintosh and the Windows option you choose will work together. At the least, you'll want to import data from a Windows application into a Mac program, or vice versa. In a networked environment, you'll want access to E-mail, file sharing, and servers from the environment you're currently working in. You might be happy with having your E-mail consolidated so it appears in only one environment, but you'll still want access to servers.

No matter which Windows option you choose, get a program to mount your PC disks on a Mac and a program to mount your Mac disks on a PC; the total cost of the two will be about \$325.

A Power Mac includes Apple's Macintosh PC Exchange PC-disk-mounting utility, so owners of these Macs need only get a Mac-disk mounter for their PC colleagues. (System 7.5 also comes with PC Exchange.) You'll also want the convenience of sharing disks freely rather than relying on just network transfer. (For details on disk-mounting software, see "Cross-Platform File Transfer," *Macworld*, December 1993; and a review of three recently updated file-transfer and translation utilities, *Reviews*, April 1994.)

All the products reviewed here sup-

port PC CD-ROMs, although you usually need to install the (supplied) driver in DOS. All support printing to PostScript and non-PostScript printers, although the Mac will need the appropriate driver for non-PostScript printers.

The OrangePC setup supports the use of external SCSI PC drives as shared volumes (you'll need Apple's Macintosh PC Exchange 2.0 software to mount them on the Mac desktop). In our initial tests, however, we couldn't use either Mac or PC SCSI drives as a shared volume. As it turned out, OrangePC doesn't automatically install the utility necessary for sharing in your start-up PC drive. Once installed, drive sharing worked fine with both drives. But you'll experience a slowdown in drive-access speed if you share PC drives as Mac volumes, because of how the data moves between the Mac and the OrangePC board. If you need fast access to an external PC drive, use a PCMCIA-based hard drive or a SCSI drive connected to the OrangePC card via a PCMCIA SCSI adapter. Both the Model 250 and 290 support PCMCIA.

The OrangePC software provides limited copying and pasting of unformatted text between Mac and DOS programs and from Mac to Windows applications. It copies graphics only from Windows programs to Mac programs, and then only as bitmaps. Text copied from a Windows program is converted to a bitmap graphic when pasted into a Mac program. Because of these limitations, don't try to copy information via the Clipboard. Instead, save the file in a common file format—such as RTF for formatted text, TIFF for bitmaps, or EPS for drawings—and transfer it via network, floppy, or shared volume.

Through optional PCMCIA network cards, you can connect a Model 250 or 290 OrangePC card to a PC Ethernet or Token Ring network. Another option for any of the OrangePC cards is to use a par-

allel-to-Ethernet adapter card. Either way, you'll need the appropriate PC networking software, too.

SoftWindows With SoftWindows, moving files between Windows and the Mac is easy. Because the program lets you set up shared drives that are accessible to both environments, you can just use each environment's file-management capabilities, such as dragging files into a folder.

a utility that simplifies the process.

Like most of the other products, Timbuktu allows basic cutting and pasting of unformatted text and bitmapped graphics. And because you're controlling a Windows PC from your Mac, you have access to any network services available from that PC. The PC users won't see the Mac or its services, though, unless you use a program such as Miramar Sys-

Windows subsystem. The cards could use better documentation, and I wish they were less expensive and performed closer to their CPUs' rated speed. But the OrangePC cards are still the most versatile and best-performing options.

Finally, it looks as if we can start laying to rest the old Macintosh-versus-Windows debate. Earlier this year, the Power Mac introduction showed that the

I wish they were less expensive, but the OrangePC cards are the best options

We couldn't access a PC SCSI drive attached to the Mac, though, even with Macintosh PC Exchange 2.0 installed. The Mac recognizes the PC drive, but SoftWindows can only recognize PC hard drives connected via a network; you cannot set the software to recognize PC hard drives connected directly to the Mac via SCSI.

SoftWindows also has a function, called SmartCopy, that lets you transfer unformatted text and bitmapped graphics between Mac and Windows programs. The function is rudimentary, but it does let you quickly move pieces of text and graphics between programs.

SoftWindows lets you install standard PC networking software—such as Novell NetWare or Microsoft Windows for Workgroups—and transform your Mac into another PC on the network. SoftWindows uses whatever network the Mac has: LocalTalk, Ethernet, or TCP/IP. If your PCs are networked via Ethernet but your Macs are connected via LocalTalk, you can use the SoftNode gateway feature to connect them. With SoftNode, another Mac that's connected to both the PC Ethernet network and the Mac LocalTalk network acts as the router for the Mac using SoftWindows.

Timbuktu The Timbuktu software includes options to transfer files between Macs and PCs. You can edit the PC's Windows configuration file so that the Mac can recognize, say, a PC file with the QXD extension as a QuarkXPress file. That way, you simply double-click on the QXD file to open it after it's been transferred to the Mac. The Timbuktu for Windows setup includes most common file-type maps, such as XLS (Microsoft Excel), PM4 and PM5 (Aldus PageMaker), and DOC (Microsoft Word). Unfortunately, the configuration process is obscure—even to many Windows users—and Farallon should include

items' \$199 Personal MacLAN Connect (805/966-2432, 800/862-2526) on the PC being controlled.

If multiple Macs try to control one PC, only the first Mac gets access. The others get a message saying the server is unavailable. This prevents the kind of system crashes that occurred in previous versions of Timbuktu as a result of simultaneous calls to shared resources.

The Last Word

Sometimes the best option is to get a PC in addition to your Mac. However, that's not the best option most of the time (if for no other reason than limited desk space).

Insignia's SoftWindows works with only a select few Macs, and its performance is at the low end of business-PC performance. SoftWindows is best suited for home and small-office users, given its relatively low cost. Even with its higher price, though, a low-end OrangePC card may be a better deal in the long run, depending on the degree of Windows performance you need. That's because OrangePC cards are compatible with all Windows programs and are all but certain to be immediately compatible with the next version of Windows.

Timbuktu is a great solution for many Mac owners because it lets you use existing PC resources and can run from any Mac. It does require a separate PC—not a problem for most companies, although a potentially big burden for small offices and home users.

For most Macintosh users who also need regular access to PC software, though, Orange Micro's cards are the best bet. They come in a range of configurations and prices, so you can buy the amount of power you need. All models are expandable, so you can add peripherals. And all the cards let you replace the CPU, so you can increase your performance as needed without replacing your entire

Macintosh could compete quite well on a price/performance basis with PCs. And now that you can efficiently run Mac and PC software from the same machine, you can have the best of both worlds. How long will it be before your coworkers with PCs come to the same realization? **m**

GALEN GRUMAN is a senior associate features editor at *Macworld* and a longtime reviewer of PC software for *InfoWorld*.

PC COPROCESSING

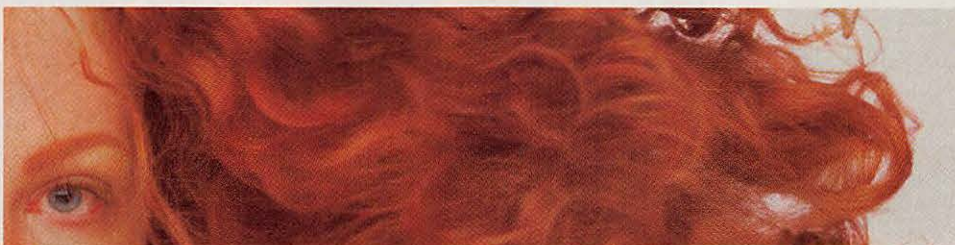


Performance and long-term viability are the key considerations when choosing the best options for running Windows on Macs. Some users can live with slow performance if they need Windows applications only occasionally.

OrangePC Model 210 With a 33MHz 486DX CPU, this should satisfy most business and home users. You'll likely want to increase the 4MB of on-board RAM to 8MB, and you'll have to buy Windows separately, but the OrangePC card offers the best long-term solution and the best performance. **Company:** Orange Micro. **Direct price:** \$1283.

Timbuktu Pro 1.0.3 for Macintosh and Timbuktu 1.1 for Windows For a networked environment, Timbuktu provides the most cost-effective solution to running Windows from a Mac. It also provides good performance if used with a 66MHz 486DX2-based PC or better and with at least a 20MHz 040-based Mac. **Company:** Farallon Computing. **List price:** \$199 each.

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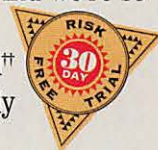
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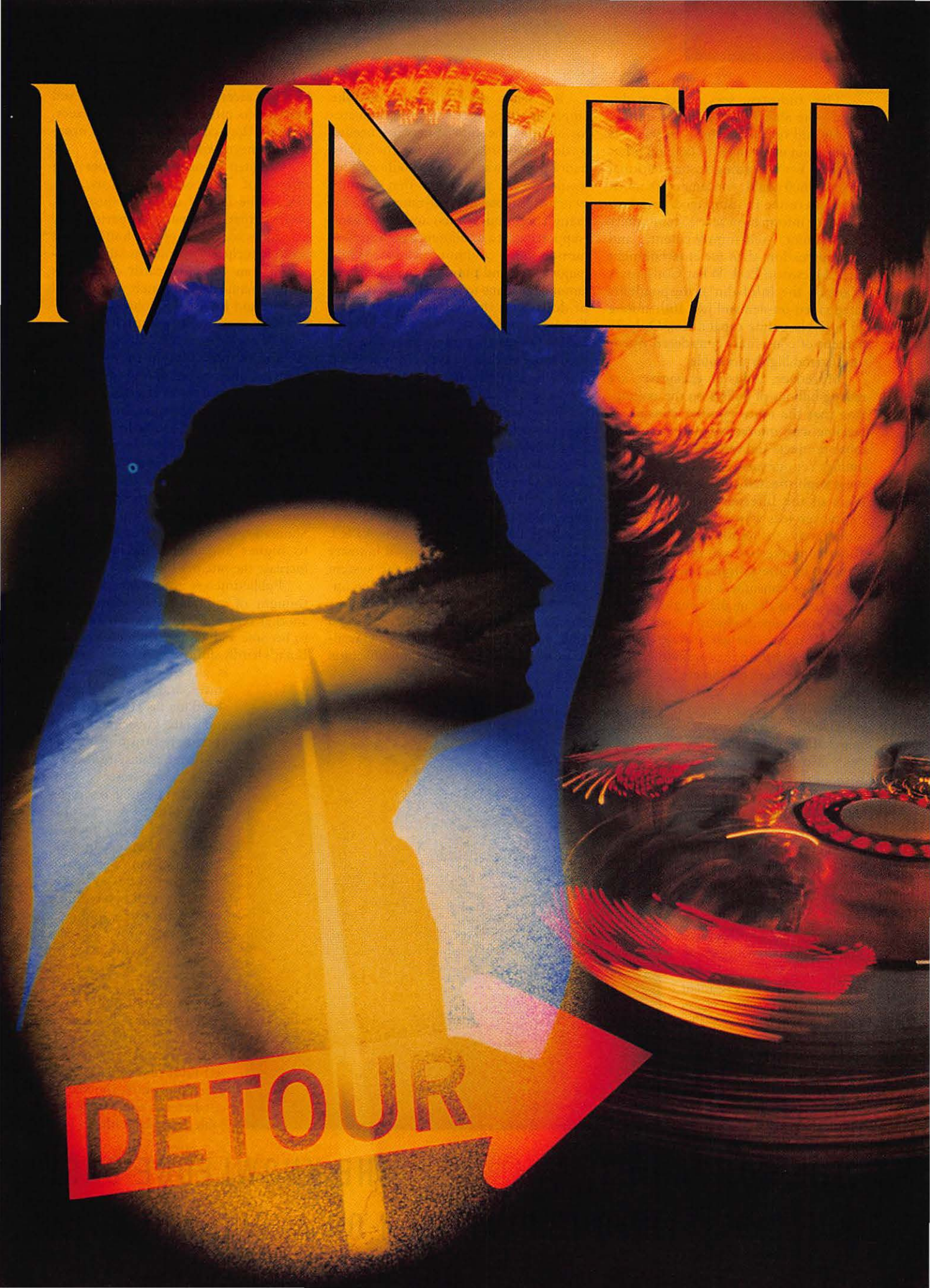
CONSUMERS WANT MORE
THAN TV OVERLOAD FROM THE
INFORMATION SUPERHIGHWAY.
BUT WILL THEY GET IT?

Five hundred television channels. Picture, data, and video links between nearly every person in the country—eventually the planet. The ultimate triumph of Marshall McLuhan's global village. The greatest technological marvel of the modern era. These are the promises of the computer and television networks of the future.

But what do people really want on the emerging "information superhighway"? And will they really get what they want? A *Macworld* public-opinion survey, one of the most extensive benchmarks of consumer demand for interactive services yet conducted, begins to answer those questions. And the information superhighway industry, primarily telecommunications, cable, and computer companies—rapidly rolling out high-tech entertainment and shopping services—may be in for a shock.

BY CHARLES PILLER

MINNET



DETOUR

The industry sees video-on-demand—the ability to select from among movies and television shows at will—as the fountain of revenues to develop other services. Yet according to our national survey of 600 adults, consumers are much more interested in using emerging networks for information access, community involvement, self-improvement, and communication, than for entertainment (see “Macworld Poll: What Consumers Want on the Infobahn”). Respondents rated video-on-demand just 10th among 26 possible online capabilities. Only 28 percent of consumers considered video-on-demand highly desirable.

Moreover, industry executives are risking billions of dollars on the assumption that the more familiar consumers become with interactive electronics, the more products and services they will buy online. Yet our survey shows that today's most sophisticated consumers—current users of the Internet and commercial online services who rank themselves as moderately to highly knowledgeable about computers—have the same tepid interest in entertainment services that most other consumers have. That calls into question the media conglomerates' information superhighway strategy.

Will the public get a diverse, fully interactive platform for communications, with expert filters for directing a traffic jam of useful information? Or will it get, as David Letterman once quipped about his TV show, “an information highway without the information”?

What the Net Builders Envision

Based on what key players in building giant interactive networks say, the Letterman scenario seems probable. When telecommunications executives attend high-profile technology summit meetings with politicians, they speak eloquently about Vice President Al Gore's far-reaching vision of a fully wired society. The information superhighway will become a dynamic force for social good, they say, improving communication, education, medical care, and political participation.

But when they talk business, the emphasis shifts. After all, cost estimates for building the kind of network needed to deliver Gore's vision for the entire nation run upwards of \$400 billion. This would create a network that is fully switched (supporting real-time, many-to-many communications) and broadband (supporting, at a minimum, two-way, full-motion video communications). While major cable and phone companies have announced plans to spend tens of billions of dollars on the new networks, their financial commitments over and above routine infrastructure maintenance and upgrading amount to only a tiny fraction of the tens of billions. The extra money has to come from somewhere.

That somewhere is “killer applications”—video-on-demand, home shopping, interactive games, and direct-response advertising—says Raymond Smith, a key industry leader who is chairman of Bell Atlantic, one of the seven regional telephone monopolies (known as the Baby Bells) formed after the AT&T breakup in 1984. Smith told an industry conference that ultimately the system could include “society-transforming applications like telemedicine, telelearning, and telecommuting.” He didn't say when such applications might be widely available, nor did he mention communication

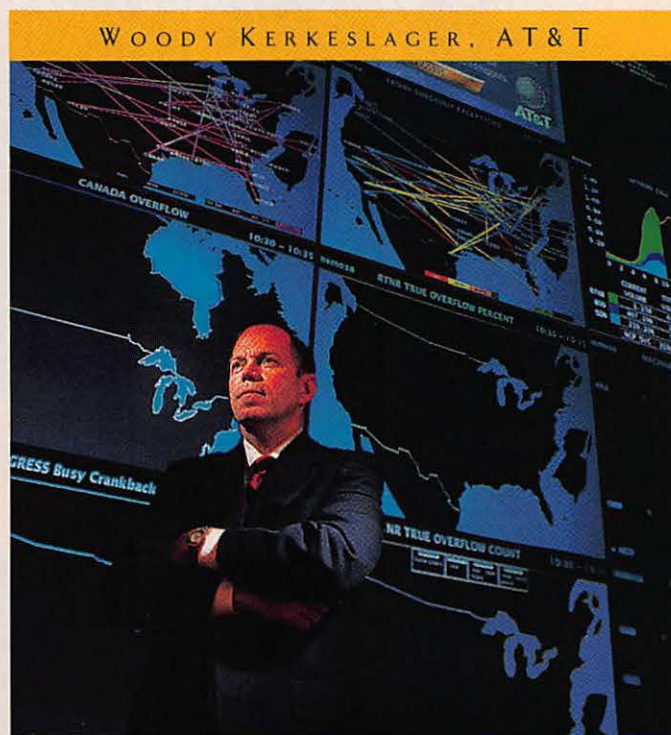
between users or civic involvement. And neither do most other industry execs. Instead, they concentrate on the near-term moneymaking opportunities.

Brendan Clouston, chief operating officer of Telecommunications, Inc. (TCI), the largest cable-TV provider, predicts that information superhighway providers will soon create hundreds of lifestyle niche shows on specialized subjects, from cars to health care, built around name brands such as General Motors and Johnson & Johnson. Clouston says such networks might include “long-form commercial messages—15, 30, and 60 minutes—to fit with these lifestyles.” In a recent appeal to advertisers, he proposed networks that become, “in effect, 24-hour infomercials.”

Paul Shumate, Jr., executive director of Access Network Technology Research at Bellcore (a research consortium for the Baby Bells), sees video games as a lucrative market because of their addictive quality. “You try to suck 'em in cheap,” Shumate told *Macworld*, “then, as they get to higher and higher [game] levels, increase the rate per minute.”

Public-interest groups shudder at the thought of applying this approach to another service that the industry expects to become a killer app: online gambling. But it's hardly surprising. At-home betting is already legal in several states, and in these days of shrinking tax revenues, local and state governments increasingly turn to gambling as a hedge against insolvency.

Industry rejects concerns that the mix of services to be offered gives short shrift to the social good. If people want entertainment, shopping, games, and gambling, then industry serves the public well by providing those capabilities, industry argues. Most providers seem to agree with Richard McCormick, chairman of US West, another Baby Bell, who recently told a U.S. Senate hearing, “The market is the public interest.” This reasoning may become a self-fulfilled prophecy, however. In practice, the market is whatever the phone and cable companies offer.



**“THE COMPANIES DON'T HAVE THE KNOWLEDGE BASE
OR THE PLATFORM OR APPLICATIONS TO**

WHAT CONSUMERS WANT ON THE INFOBAHN

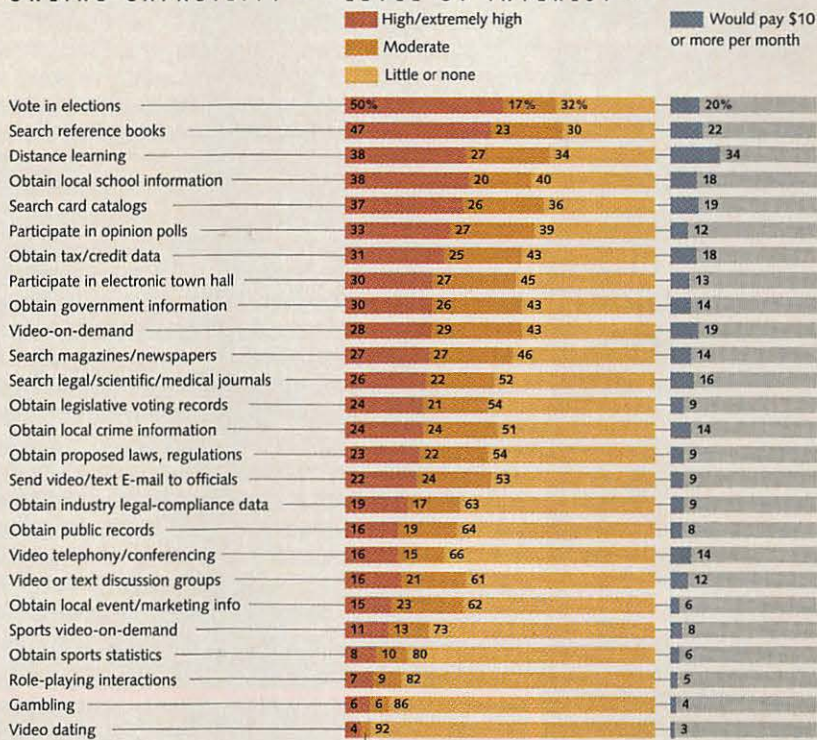
Macworld conducted a national public-opinion survey of 600 adults to answer some of the most critical information-superhighway questions facing industry and government: What interactive capabilities do consumers want, and how much would they pay for those capabilities? Industry assumes that video entertainment services should be the principal initial goal of emerging networks, and that entertainment represents the greatest area of consumer interest. We found that obtaining movies and TV programs on demand ranked just 10th among 26 possible capabilities.

According to our survey, consumers are much more interested in using emerging networks for information access, involvement in civic affairs, self-improvement, and communication, than for entertainment. These results held firm regarding the cost of infobahn services. More than one-third of respondents would pay more than \$10 a month for distance learning. Yet less than one-fifth would pay \$10 or more per month for video-on-demand.

Industry executives also assume that consumers who are more familiar with interactive electronics will buy more products and services online. Yet our survey found that today's most sophisticated consumers—users of the Internet and commercial online services who are moderately to highly knowledgeable about computers—display the same tepid interest in entertainment services shown by most other consumers.*

ONLINE CAPABILITY

LEVEL OF INTEREST**



*Differences in responses of average and sophisticated consumers do not exceed the margin of error.

**Telephone survey interviews were conducted by an independent research firm; respondents were unaware of Macworld's sponsorship. We surveyed 375 randomly selected adults and 225 randomly selected adult subscribers to Macworld in the United States. Results from the two groups were virtually indistinguishable. Margin of error is ± 4 percent. Percentages do not add up to 100 due to "don't know" responses.

What Consumers Want

Are industry leaders misjudging the nature of the emerging electronic marketplace? The Macworld poll suggests that the public may be on a very different wavelength. Voting in elections was the most desired online capability, highly coveted by fully half of our sample. Sixty percent of respondents expressed a moderate-to-strong interest in being a part of public-opinion polls; 57 percent would like to participate in interactive, electronic town-hall meetings with political leaders and other citizens; and 46 percent want to send video or text E-mail to elected representatives.

These are poignant findings in a nation where anemic voting totals are the norm and many citizens typically view civic affairs with the same enthusiasm they reserve for a trip to the dentist.

Respondents also want the following potential online capabilities more than

video-on-demand: on demand access to reference materials; educational courses or how-to programs that allow interaction with a class or instructor (distance learning); interactive reports on local schools; and access to information about government services and training. And respondents say they would vote with their pocketbook for such self-improvement services. Thirty-four percent of the sample would pay \$10 or more a month for distance learning. Yet only 19 percent of our sample would pay \$10 or more per month for video-on-demand or other entertainment services.

And customers of commercial online systems and the Internet—which is now growing by an estimated 100,000 or more users *per month*—have demonstrated a large market for online communication and interactive information services, as well as a hunger for all manner of educational resources.

No Back Talk

The industry certainly agrees with the concept of enhanced communication and elaborate interactivity—indeed, these are the Holy Grail in superhighway advertising imagery. But what is the industry really doing to find that Holy Grail?

So far, not much for the near future. In the video world, sophisticated interactivity requires high two-way *bandwidth* (the capacity of data pipelines) to transmit the massive digital streams generated by video images. Video-on-demand and home shopping require extremely high *downstream* bandwidth (from service provider to user) but only a trickle of *upstream* capacity (to relay simple commands from users back to the giant servers that will deliver movies and L. L. Bean catalogs).

Industry will build these highly asymmetrical systems because they are vastly cheaper and easier to create and manage

DELIVER THOSE NEW CAPABILITIES."

Industry's Blueprint: Grand Vision or Distant Dream?

What are the net builders building?

Their construction plan is where the future takes shape. And it's a future that diverges fundamentally from the idea that communication and information access should be top goals of the information superhighway.

Most phone and cable companies have adopted a hybrid fiber-optic/coaxial approach for the networks' physical structure. Fiber-optic cables—the highest-bandwidth transmission medium—that can carry a few hundred “channels” of broadcast-quality video would be linked to coaxial cable (the standard for cable-TV transmission) connected directly to users' equipment. Typically, coaxial from some 500 households would feed into a single fiber-optic cable.

High bandwidth doesn't necessarily make for a diverse net, however. In most cases, about 80 percent of the channels would be reserved for the one-way broadcast of movies and other entertainment services—the standard cable-TV model.

Nor will most systems be particularly interactive. The term video-on-demand suggests an immediacy and range of options that won't exist in most systems for many years.

Less than Meets the Eye In a typical example, Ameritech, the midwestern Bell operating company, has proposed to roll out a \$4.4 billion network consisting of 390 channels. But don't worry about the challenge of surfing 390 channels. It would take up to 6 channels to broadcast, for example, a single feature film.

Seventy channels would be assigned for one-way, analog broadcast of entertainment programming, akin to today's cable systems. Those channels would probably be used to transmit major TV network choices. Another 240 channels would be reserved for *digital multicast* services. Those would also provide one-way broadcast, similar to today's cable TV, and would likely be filled with a variety of pay-per-view offerings. How would most channels be allocated? At first, expect the week's top hit movies to run every 5 to 30 minutes.

Customers could pause movies. Well, not actually pause like a VCR. They could stop the movie, then pick it up at a later transmission slot. For example, if you pause for two minutes to grab a snack, you might be queried, “resume at three minutes before paused scene, or eight minutes before paused scene?” This is not pure on-demand, but it's better than today's pay-per-view. The system would offer more choices than conventional cable, although nothing like the mind-boggling variety of a video store.

“If you're going to offer 50 movies, you'd better set aside 300 channels,” says U.S. Representative Rick Boucher (D-Va.), a proponent of a rapid deployment of broadband networks. “That gives you a more sobering picture of how the information infrastructure may be used for these video-on-demand applications.”

available for some time. Programmers would lease those 80 channels from Ameritech, then offer any service they think would sell. Some information or education options might be attempted at the margins.

Unfortunately, the 80 channels would be shared by 500 homes; once 80 consumers (or, realistically, far fewer requesting high-bandwidth video services) plug in, successive customers would be blocked out. “When you've got 500 homes and [80] channels, damn few people can get video-on-demand,” says Timothy Regan, a public-policy vice president with Corning, a fiber-optic supplier.

Higher-level interactivity will be hamstrung by a highly asymmetrical design. The system would supply massive bandwidth downstream to consumers—about 750MHz to each user—but reserve almost nothing for

tem? “Originally the fiber-to-the-curb model was favored,” explains Paul Shumate, Jr., a network-technology executive at Bellcore. Such a system would have provided one fiber-optic cable for about every six homes. “That would have permitted very respectable upstream services. You'd have been able to send compressed digital video with no trouble. But those kinds of platforms were perceived as too expensive and as having too many [technical] problems. [The salable services] that they could identify in the near future were much more video- and cable-like.” Like reasonable upstream bandwidth, fully switched (many-to-many), real-time communication abilities would have to be added in the undefined future.

When will a panoply of broadband services on switched networks—the essence of Vice President

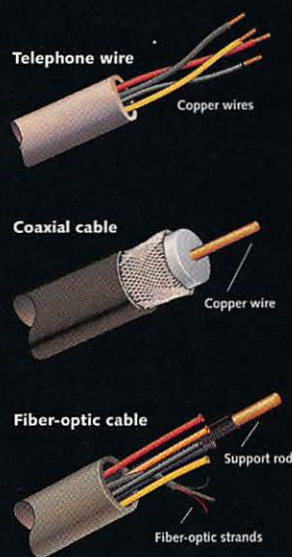
Wiring the Infobahn

Most telecommunications companies plan to build interactive-TV systems over the next decade based on a super-cable TV model—one fiber-optic cable connected to 500 or more homes via coaxial lines. Super-cable TV would offer efficient delivery of video entertainment and shopping services but would not permit communication or elaborate interactivity. Only a few consumers at a time could obtain video- or information-on-demand.

Advocates of the Internet model—which emphasizes communication over the purchase of video services—want to add Integrated Services Digital Network (ISDN) technology to standard phone lines. ISDN systems could get the public up and running on switched networks offering high-speed data, sound, and low-quality video within five years, for a fraction of the cost of the super-cable TV systems. ISDN cannot handle broadcast-quality video, however.

Some experts want to use fiber-coaxial networks and ISDN over phone lines simultaneously. This dual-system approach would offer communication and information services, as well as the video services the industry believes will finance more-advanced future networks.

Eventually, high-speed networks based on one fiber-optic cable for every six homes could supply enough upstream bandwidth to support interactive TV, elaborate information-on-demand services, high-speed transfer of massive data files, and switched video communications on a single system. No companies plan to build such costly systems anytime soon, however.



Finally, Ameritech would reserve 80 channels for higher-priced, switched-digital service. This would also involve one-way transport of video signals, but the consumer could give commands such as ordering merchandise or movies (perhaps with a short delay), pausing movies, or placing bets. This approaches true video-on-demand, although futuristic virtual-VCR abilities and custom profiles of viewer interests would not be

upstream communication from consumer to provider—about 35MHz shared among 500 homes. Real-time, full-motion video requires 6MHz. So up to 6 homes could theoretically achieve this for, say, videoconferencing (although few systems will actually be equipped to handle it).

A System for Our Grandkids

Why not use optical fiber exclusively, rather than a fiber/coaxial hybrid sys-

tem? “Originally the fiber-to-the-curb model was favored,” explains Paul Shumate, Jr., a network-technology executive at Bellcore. Such a system would have provided one fiber-optic cable for about every six homes. “That would have permitted very respectable upstream services. You'd have been able to send compressed digital video with no trouble. But those kinds of platforms were perceived as too expensive and as having too many [technical] problems. [The salable services] that they could identify in the near future were much more video- and cable-like.” Like reasonable upstream bandwidth, fully switched (many-to-many), real-time communication abilities would have to be added in the undefined future.

When will a panoply of broadband services on switched networks—the essence of Vice President

They could decrease the number of homes that would share a single fiber cable to, say, 125. But some industry executives consider this approach shortsighted.

"Bandwidth is like money. The more you have, the more you want," says Corning's Regan. "You'll always be constrained by your coax cable." Despite Corning's evident self-interest, Regan is hardly a voice in the wilderness when he suggests that the industry should simply swallow hard and make the investment that seems to be required by the inevitable march of technology.

It's not just a matter of bandwidth, however. Cable-TV companies suggest that their systems can be converted from one-way, analog broadcast to interactive, fully switched digital communication virtually overnight. This is far from certain. "The feasibility of two-way communications using existing coaxial networks is unproved and years away from widespread commercial availability," Alex Mandl, executive vice president of AT&T's Communications Services Group, told a congressional subcommittee in February.

Meanwhile, asynchronous transfer mode, or ATM, a data-transfer method that more effectively uses available bandwidth and supports a wide range of telecommunications services (such as voice, broadcast-quality video, and videoconferencing over phone lines, coaxial cables, or optical fiber) costs about \$10,000 per connection. Prices should eventually come down significantly but not until after the turn of the century.

And even if we had a system of switched, high-bandwidth nets connecting every building in the country, many multimedia and on-demand services would still be a long way off. Data-compression techniques, video servers to stream different signals to tens of thousands of consumers simultaneously, set-top boxes, and distribution and interface software—not to mention interoperability standards between TVs, set-top boxes, and computers; billing systems; copyright-protection and privacy-protection schemes—are all remote.

How fast will the technology mature? Estimates vary, but just about everything in the interactive-TV realm is running waybehind schedules anticipated just last year.

than fully interactive systems (see the sidebar "Industry's Blueprint: Grand Vision or Distant Dream?").

High-bandwidth interactivity—needed for some distance learning, long-distance medical consultations, two-way visual participation in electronic town halls, or merely for transferring large data files quickly, for example—won't happen on a large scale anytime soon. People will be able to view or download video and data, but they'll be able to return little or no data to the source.

Information-on-demand and distance learning—both among the top-rated services in our survey—won't be available for mass consumption until interactive TV takes off, says Woody Kerkeslager, vice president for technology and infrastructure at AT&T. "The companies don't have the knowledge base or the platform or applications to deliver those new capabilities. The logical way to start is by incrementally adding to something the consumers know well, which is television."

Some segments of the industry find this approach to be discouragingly cautious and say that it will not be easy or cheap to upgrade. "The nature of the architecture that's being deployed is not what we all think about when we talk about the information highway," says Timothy Regan, a public-policy vice president with Corning, a leading supplier of optical fiber. "For all intents and purposes, these are advanced cable-TV systems. [The Baby Bells] say that someday we will have high-bandwidth upstream systems." But that day is a long way off.

No Personal Connections

At first, large-scale interactive-video systems will not support user-to-user contact (beyond the plain old telephone service that could be integrated in some networks). "This shows the gap between the information superhighway rhetoric and reality," says Daniel Weitzner of the Electronic Frontier Foundation, a Washington, D.C., nonprofit group that supports switched, interactive networks. The EFF argues that communication should be the essence of the emerging networks from the beginning.

Weitzner agrees with Corning's Regan that industry plans do not reflect the public interest, but for different reasons. The EFF believes average consumers need and have the right to what the foundation calls open platforms—affordable, narrow-band, switched-digital services with modest two-way video capabilities—as a digital bridge to eventual broadband communications.

The *Macworld* survey seems to validate the EFF's views. Broadband systems are hardly necessary to achieve many of the civic involvement, communication, and information services our respondents desire. (Indeed, modest versions of these capabilities are already in place on the Internet; commercial online services; and local community-, school-, and business-based nets scattered around the nation.)

Integrated Services Digital Network (ISDN) technology, a widely available method of transmitting digital data that can be used over phone lines, could get the public up and running on interactive digital nets before the year 2000. With a mass base of consumers, the argument goes, entrepreneurs and developers would quickly create applications and services that could serve as the basis of the broadband interactive future.

Unfortunately, a catch-22 holds back ISDN: until it is produced for a mass market, ISDN will be too costly for the vast majority of consumers, and prices will remain high until many more customers demand the service. More important, some phone and cable companies do not see ISDN as a major long-term profit center because it can't be used for video-on-demand or sophisticated home shopping. And they argue that ISDN-type schemes will ultimately be supplanted by broadband nets anyway—a transition that telecommunications giants believe they must make as quickly as possible to survive in an increasingly competitive marketplace.

The decision to go directly to broadband with a limited range of initial services could have far-reaching, unanticipated consequences, however. If industry defines shopping, gambling, advertising, and entertainment as the primary purpose of interactive networks, communication and community may not grow as naturally as people seem to expect. "They're not just building networks," says Andrew Blau, a superhighway expert with the Washington, D.C.-based Benton Foundation. "They're building expectations of what the networks are for."

And those expectations might be narrowly defined by the affluent, predominantly white consumers who will get interactive video ahead of the rest of the nation (see the sidebar "Gerrymandering the Electronic Future?").

If You Build It, Will They Come?

Still, maybe the industry deserves the benefit of the doubt. After all, the phone and cable companies say that they identify their ultimate self-interest with the fully switched, diverse, broadband nets of the future. And computer makers and con-

tent providers want to equip and enlighten information-hungry consumers.

The net builders claim to have a business model that will deliver this dream. That model is based on two major factors: consumer response to earlier technologies, and tests of interactive services. The industry looks first at the precedent of our high-quality, near-universal, affordable telephone service. It took about 70 years for 50 percent of Americans to obtain phones, but consumers adopt new technologies much faster now. Nearly all U.S. households had TVs within 34 years of its introduction, and VCRs rocketed to 65 percent market penetration in just 13 years. Some 30 percent of households now own personal computers, 20 years after they became mass-market products.

But do buying trends for consumer electronic devices make for a good information superhighway comparison? The biggest expenses will go toward creating and running the massive networks. The telecommunications industry will never recoup such expenses selling the set-top boxes consumers will use to interact with the networks. So where will the money come from? Raiding other industries. Consumers rent videotapes to the tune of some \$13 billion a year and spend much more on mail-order merchandise. The industry reasons that people will pay for a narrower range of choices purchased more conveniently through their TVs.

"We've learned enough in the testing we've done to know that there is significant demand" for interactive video, says Bruce Ravenel, vice president of TCI Technology, a division of TCI. "The challenge now is getting the costs to the point where it's a good business."

But how convincing is the evidence that industry's plan will make interactive TV profitable enough to finance diverse interactive networks? Not very. Bear in mind that home-shopping and -banking experiments of the late 1970s and 1980s failed dismally. And *Macworld's* survey contradicts the idea that most consumers will want video-on-demand.

Our findings validate a 1994 survey of 4000 con-

sumers conducted by Odyssey, a market research firm, that concluded that movies-on-demand will appeal to a relatively small group of technology enthusiasts. Other surveys have shown similarly weak interest in video shopping.

Some industry analysts discount the experience of old services and the views expressed in surveys as unreliable prognosticators. They say consumers don't understand new technologies well enough to judge their own future buying habits. Instead, the companies test-market actual services. More than three dozen such tests, most using from 50 to 7000 consumers, are being conducted or planned.

Interactive TV Tests Flop

The results? So far they don't suggest a winning formula. For example, TCI's flagship test program is an interactive-TV system for about 300 customers in the Denver area. TCI boasts that buy-rates in that test run about 12 times as high as for typical cable pay-per-view. That sounds impressive until you learn that this translates into about one movie per household every two weeks. At \$2.99 to \$3.99 a pop, it hardly seems like an engine to drive the network of the future.

"If you're betting the farm on every person using your service four times a week, unless you're offering food, you're

making a big mistake," says the Benton Foundation's Blau.

In fairness, "some of the greatest products we have today started out very slowly," AT&T's Kerkeslager points out. "If you're looking for a killer app that will emerge in the space of a year or two, you won't see it. But there is a market here, and I expect that we will find it."

Still, it's far from certain that these systems will pay their keep anytime soon. "The fact is, every interactive cable experiment so far has failed," Ted Turner, creator of Cable News Network, told *Business Week* last year. "Maybe in another generation it will work."

And remember, broadcast and standard cable networks are not going away. It will be hard for any single industry to gain a commanding share of viewers. For example, the Baby Bells' planned interactive-video systems will have to capture some 35 percent of current cable-TV customers to turn a profit. And those customers would have to pay at least \$40 to \$55 a month for new video services, according to industry estimates.

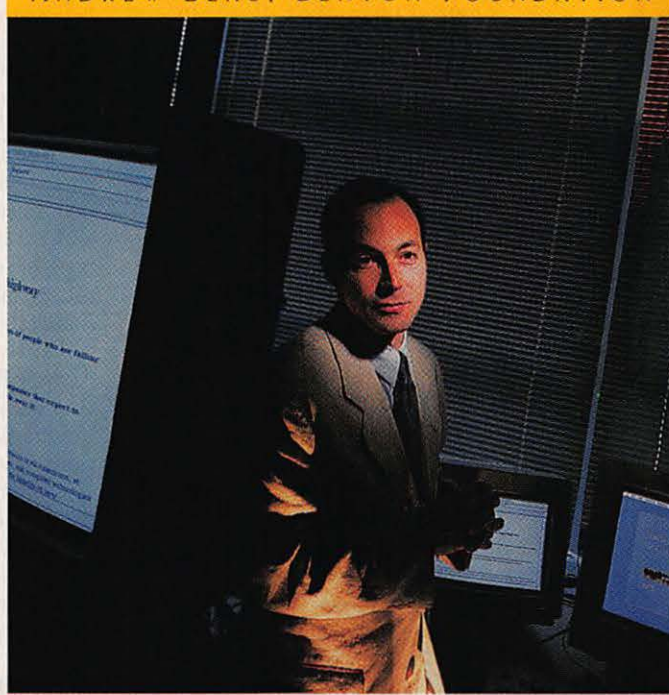
No one knows whether consumer demand will make interactive TV profitable, but the stakes are high for the first services. If consumers don't buy in big-time, infobahn construction could stagnate or even reverse direction.

"If we find that the demand is not there, we won't hesitate to slow down" the expansion of services to all areas, says Larry Plumb, a spokesman for Bell Atlantic, which has aggressive video-network plans. "No one wants to build something that no one wants," he adds. "But you have to start somewhere."

Changing the Rules

Sometime this fall, that starting point may shift dramatically. Two bills that have recently passed in the U.S. House of Representatives could soon make debates about the industry's current strategies "seem like listening to a Frankie Avalon record," according to Representative Edward Markey (D-Mass.), one prime mover of the legislation.

ANDREW BLAU, BENTON FOUNDATION



**"THEY'RE NOT JUST BUILDING NETWORKS.
THEY'RE BUILDING EXPECTATIONS OF WHAT**

WHAT WIRING SYSTEM DO YOU NEED?

Under current law, nearly all local phone connections are provided by the seven Baby Bell companies, which are prohibited from offering long-distance services. The Baby Bells can build and operate video networks, but they cannot own more than a small interest in the content of their transmissions. Long-distance carriers are prohibited from competing for local phone service. Cable TV may be offered in either a monopoly or competitive situation, depending on local regulations, and cable providers can own substantial portions of their content.

In general, the three industries have kept to their separate realms. But in the rush to provide sophisticated online services, they are jealously eyeing each other's markets. They all argue that the increasing convergence of computing, telecommunications, television, and information services has rendered distinctions between these realms obsolete. More important, they say, current law cripples the technical and economic progress needed to build the information superhighway quickly.

Many legislators agree. The House legislation would massively deregulate telecommunications and cable, leading to something close to free-for-all competition between cable, local phone, and long-distance companies. In principle, competition increases risk-taking that stimulates the creation of affordable, diverse services. In short, the legislation is intended to encourage the development of a superhighway that can handle communications and information services, and enable civic involvement as well as video-on-demand and home shopping.

If the legislation becomes law, the Federal Communications Commission (which regulates telecommunication) would define "universal service" in the age of interactive digital communications and try to ensure that schools, hospitals, and other public services, as well as the poor, don't get left behind. The FCC would work to avoid what Markey calls "information apartheid."

Some public-interest groups decry the legislation's lack of subsidies for non-commercial programming. Simply wiring up schools and hospitals "is an insufficient quid pro quo for our democracy," says Jeffrey Chester, director of the Center for Media Education. "We need a new public-interest standard to be sure that there is a greater diversity of voices."

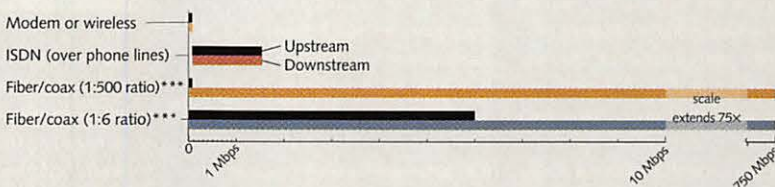
Online Capability Industry executives predict that eventually every home and office will be wired with fiber-optic cable, the highest-capacity digital transmission medium. This could cost \$400 billion or more. But high bandwidth is not needed for most infobahn features. A modest 9600 bps can support 20 of the 26 capabilities *Macworld* surveyed, and 8 of the 10 most desired, including information-on-demand, communication, interactive reports from schools, and some forms of distance learning—albeit slowly and without elaborate multimedia features.

Bandwidth Ranges Most near-term strategies use one fiber-optic line for every 500 coaxial cables. Such systems could offer video services using extremely high downstream bandwidth from service provider to user. Only a trickle of upstream capacity—less than 1/10,000 the downstream bandwidth—would be reserved to relay simple commands from users back to the giant servers that would deliver movies, games, and shopping catalogs. Transmission over phone lines using ISDN offers higher upstream capacity than the planned fiber/coax systems, and could be implemented easily and inexpensively, but doesn't support broadcast-quality video.

ONLINE CAPABILITY*

	Minimum Required Wiring	
	Partial Capability	Full Capability
Vote in elections	modem	modem
Search reference books	modem	ISDN
Distance learning	modem	ISDN
Obtain local school information	modem	modem
Search card catalogs	modem	modem
Participate in opinion polls	modem	modem
Obtain tax/credit data	modem	modem
Participate in electronic town hall	fiber (1:6)	fiber (1:6)
Obtain government information	modem	ISDN
Video-on-demand	fiber (1:500)	fiber (1:6)
Search magazines/newspapers	modem	ISDN
Search legal/scientific/medical journals	modem	modem
Obtain legislative voting records	modem	modem
Obtain local crime information	modem	ISDN
Obtain proposed laws, regulations	modem	modem
Send video/text E-mail to officials	modem	ISDN
Obtain industry legal-compliance data	modem	ISDN
Obtain public records	modem	modem
Video telephony/conferencing	ISDN	ISDN
Video or text discussion groups	fiber (1:500)	fiber (1:6)
Obtain local event/marketing info	modem	fiber (1:500)
Sports video-on-demand	fiber (1:500)	fiber (1:6)
Obtain sports statistics	modem	ISDN
Role-playing interactions	modem	ISDN
Gambling	modem	ISDN
Video dating	ISDN	ISDN

DOWNSTREAM & UPSTREAM BANDWIDTH RANGES**



*In order of consumer preference. **Average digital bandwidth per connection. Compression can increase bandwidth. ***Using asynchronous transfer mode.

Recognizing the kinds of challenges Chester describes, Senator Daniel Inouye (D-Hawaii) recently introduced a bill that would reserve up to 20 percent of the capacity of emerging telecommunications networks for free use by nonprofit and public agencies. It would also tax the industry to support nonprofit groups' exploitation of the new networks.

And Markey integrated the Electronic Frontier Foundation's concept of open platforms into one of the recently passed House bills. If that bill becomes law, the FCC would probably force phone com-

panies to reduce tariffs on ISDN or a comparable service. This could cause relatively low bandwidth digital communications networks to arise side by side with one-way, broadband entertainment and advertising.

Markey believes this approach would lead to a network that supports broad participation in civic affairs. "We will probably have a situation where every citizen could have, as a matter of public policy, access to public-based decision-making [materials]," he says. "I think that is right over the horizon for every American."

THE NETWORKS ARE FOR."

A Slow Road After All?

Notwithstanding Markey's confidence, the chances for telecommunications reform this year are dicey at best. The wealthy and powerful Baby Bell companies argue that the U.S. Senate counterpart to the House legislation preserves far too many constraints on competition and that it is larded with unfair regulations. But this resistance could backfire. "Congress is not going to have the stomach to do this again," says Ronald Plessner, a leading Washington attorney who rep-

resents the pace if the big players spend most of their time and money jockeying for legal position, battling regulators, and plotting takeovers.

Even if the federal reforms go through, however, advanced nets are a long way off for much of society. While the proposed laws would mandate network wiring at a reasonable cost to consumers, they do not specify when such wires must be connected. And even if the financially strapped schools, hospitals, libraries, and other public-benefit insti-

oncile competing values: building communication and community on the net versus earning large profits. Blending those two values effectively may prove to be the hardest challenge.

Advocates of telecommunications networks designed to serve social goals point to the burgeoning Internet as a model. "It's large, heterogeneous; it carries data, sound, and images; it's a multimedia network—all the things we hope the information superhighway will be," says Laura Breedon, a top infobahn in-

Gerrymandering the Electronic Future?

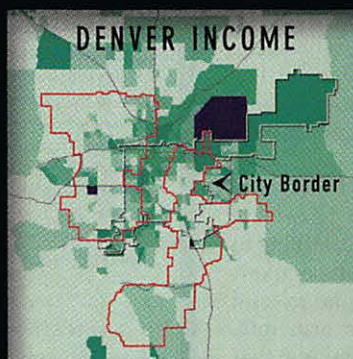
Even if the market for interactive multimedia and communications builds slowly, at least we'll get super cable TV. Or will we? If you live in a predominantly white, affluent area in or near a big city, expect increased TV choices within five to eight years. Things are a little less certain for anyone else.

In May, the Center for Media Education, the Consumer Federation of America, the United Church of Christ, and the National Association for the Advancement of Colored People filed a joint complaint to the Federal Communications Commission (FCC), which approves Baby Bell companies' applications to build advanced networks offering video services—known as "video dial-tone." The coalition accused four Baby Bells of trying to engage in "electronic redlining"—bypassing "lower-income and/or racially or eth-

nically diverse communities in their initial deployment."

Mark Cooper, an economist who assisted with the analysis, concludes that in the Chicago area, the communities that Ameritech (the midwestern Baby Bell) proposes to serve enjoy average household incomes of \$51,100, and 8.6 percent of residents belong to racial minorities. The numbers for adjacent, unserved areas are \$35,265 and 22.1 percent, respectively. In the Washington, D.C., area the figures are \$68,879 and 17.4 percent minorities for served areas, \$48,615 and 44 percent minorities for unserved areas.

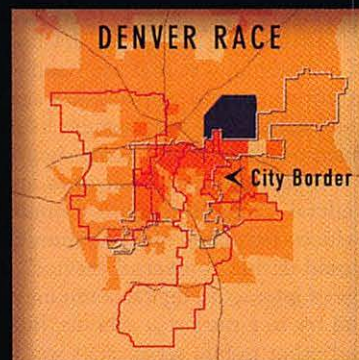
Because video dial-tone could compete with or even supplant telephone service, broadcast television, and cable television, the coalition argues, "it is imperative that this advanced network be constructed in a nondiscriminatory manner."



"This is the superhighway that has been hyped [by the Clinton administration] as the route to ending the differences between information haves and have-nots," Cooper says. "But what we're seeing is worse than the existing infrastructure," which requires phone monopolies to provide

low-cost services to the poor.

"Obviously the greater immediate returns to an information provider are for deploying high bandwidth in densely populated and wealthy areas," says U.S. Representative Rick Boucher (D-Va.), a leading proponent of advanced networking. "But it's very important that [we require] telephone and cable industries to [deploy] on a



resents a consortium of major wireless communications and cable companies. "If the Bell companies walk away from this, they might not see the welcome mat out for another five years."

If the legislation fails, advanced networks would still be built—eventually. State regulators and courts are slowly chipping away the walls between cable and phone companies, and between local and long-distance providers. The cable, computer, telephone, and television industries would probably still converge. But the infobahn will be built at a pedes-

tutions enjoy favorable rates, they'll have a hard time navigating cyberspace without equipment, training, and support. Few classrooms even have phone lines or the budgets to install them. What are they going to do with coaxial cabling or even fiber-optic connections?

What's the Rush?

In the information superhighway feeding frenzy, sorting out competing legal issues, technologies, and business plans is a daunting task. But behind these disputes lies the more basic problem of how to rec-

frastructure planner in the U.S. Department of Commerce.

The Internet is all about communication; bandwidth is secondary. Higher bandwidth would be welcome, but the Internet has transformed the digital universe at a plodding 9600 bps or slower for the vast majority of users. This bandwidth can fully support 20 of the 26 services or capabilities covered in the *Macworld* survey, and 8 of the top 10 most desired, including information-on-demand, communication, interactive reports from schools, and some forms of distance

learning—albeit slowly and without elaborate multimedia features (see “Infobahn Services: What Wiring System Do You Need?”).

ISDN over phone lines fully supports 21 of the 26 survey items, including 9 in the survey respondents’ top 10. What doesn’t it support? Primarily video-on-demand and video games.

Breeden’s agency disburses millions of dollars for projects that demonstrate how networking can strengthen education and health services and build a sense

the possibility that many people, regardless of their interests and inclinations, will take whatever is offered—the “if you build it, they will buy” theory. Online gambling strongly attracted only 6 percent of our survey sample—the second weakest response among 26 options—while 81 percent found the idea totally without appeal. But if a poker game popped up on their TV screens, how many self-described abstainers would succumb to temptation?

The information superhighway—as

That would be quite a setback.

Then again, maybe a slower process wouldn’t be all bad. After all, right now commercial online services, the Internet, and ISDN—the real research labs of the digital future—are at the threshold of delivering a lot more of what people say they want than what the phone and cable companies are proposing. But today’s services need more time to develop in ways that are socially valuable, profitable, and accessible enough for our entire society to relate to them.

roughly similar time frame in other parts of the country.”

Nobody supports discrimination. But industry leaders say that they can’t build the entire system at once—it’s too expensive. “You don’t want it broadly deployed until high demand is proved,” agrees Robert Pepper, a top FCC regulator.

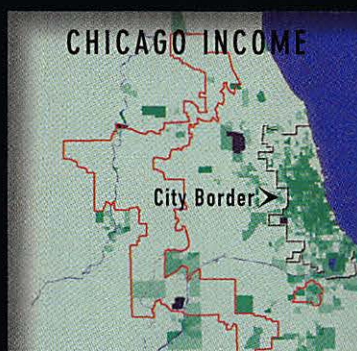
But demonstrating demand within racially and economically homogeneous populations may skew the direction of services eventually offered to the broader community. “Without representative participation, these communities will miss a significant early opportunity to . . . ‘vote’ with their dollars and ‘eyeballs’ in expressing their programming needs and interests,” the coalition argues.

“The idea that the design of the network should evolve from the needs of the community is absent in

this debate,” says Jeffrey Chester, of the Center for Media Education. “The Clinton administration has its eyes closed and its fingers crossed [hoping] that the information superhighway will end up as a democratic structure.”

Corporations and politicians suggest that applications with true social importance will evolve naturally as a function of consumer demand. But that’s hardly been the case with today’s electronic mass media. Public-affairs and community-based programming, for example, represent a minute fraction of radio and TV offerings. And they’re provided mainly to satisfy government requirements, not because of market pressure.

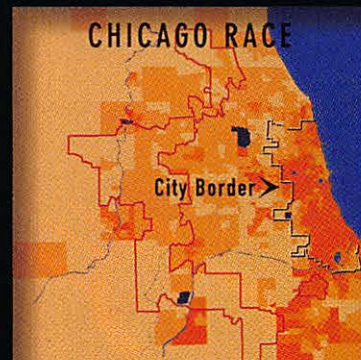
Map sources: FCC complaint noted above, and US West Communications. Mapping software and 1990 census data supplied by Map-Info Corporation, Troy, New York.



Percent Racial Minorities
 40% – 100%
 20% – 40%
 5% – 20%
 0% – 5%

Annual Income Ranges
 \$15,000 or less
 \$15,000 – \$30,000
 \$30,000 – \$45,000
 \$45,000 – \$60,000
 \$60,000 or more

Interactive-video service area
 Public facilities



of community. The program was inspired by examples from the Internet.

But the Internet’s social impact may be irrelevant if no one makes big money from it (no one does yet). And despite the phenomenal growth of the Internet, most people lack the interest, knowledge, or inclination to join that particular digital world. (If they did join, increased demand would quickly bring the Internet to its knees anyway.) So telecommunications companies watch the Internet as a potential market, not a model to emulate.

Instead, the industry plans to exploit

envisioned by the giant corporations that will define it as they build it—is the opposite of the Internet. It’s all about delivering video services; high bandwidth is critical. But for the time being—and it could be a long time—forget interaction more complex than pausing a movie, shooting down a space creature in a video game, or providing your credit card number.

The industry’s information superhighway is a huge gamble. After a few years and a few billion dollars, telecommunications executives may conclude that profit margins don’t support their model.

If those laboratories aren’t brushed aside in the race to broadband interactivity, we might actually see the most ambitious dreams of the information age realized—someday. ■

Senior associate editor CHARLES PILLER’s most recent book is *The Fail-Safe Society: Community Defiance and the End of American Technological Optimism* (University of California Press, 1993).

Research assistance by SUZANNE COURTEAU, JIM FEELEY, and JOANNA PEARLSTEIN. Technical assistance by GARY KESSLER.





Remote Access Arrives

user with the ARA client dials in to a Mac at the office that is outfitted with the ARA server software. An ARA server increases the ARA advantage by providing multiple dial-in lines. It also provides management options that accommodate multiple users with different network-access privileges—a welcome relief for overburdened IS managers.

Macworld Lab evaluated seven remote-access servers. Four of those—Apple's ARA Multiport Server, APT Communications' Multiport APT Dial Server, Global Village Communication's OneWorld Communications Server, and

Macworld Lab tests show why ARA servers are essential network tools

Not long ago remote computing was difficult at best. With modem speeds topping out at 2400 bps, Federal Express arguably offered faster, more reliable data transfer than telephone wires. The combination of cheap, fast modems and enhanced remote-communication schemes has made remote computing both convenient and easy.

One such scheme, Apple Remote Access (ARA), provides a stable, easy-to-use connection to network resources via the Chooser—exactly the way users in the office operate.

A single ARA connection can be established with software alone. A remote

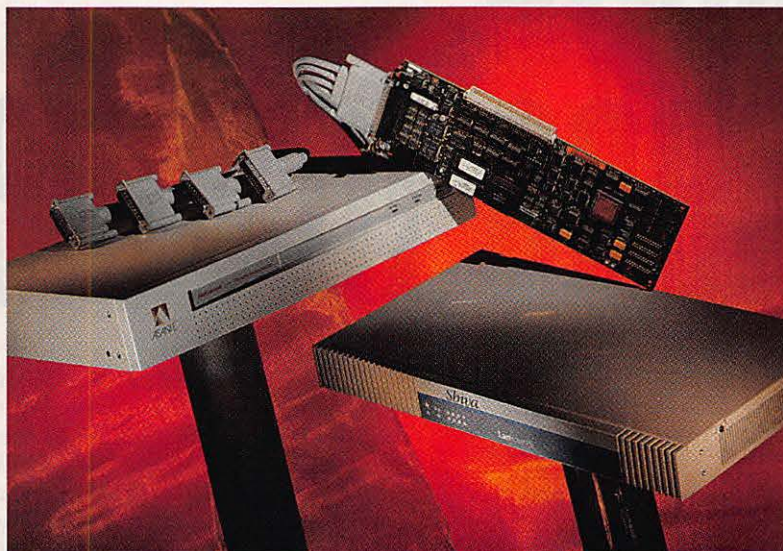
Webster Computer's MultiPort/LT Router—are designed primarily for Macintosh networks. Shiva's LanRover/E, Novell's Netware Connect, and Asanté Technologies' NetConnect Remote Access Server can switch-hit on a mixed network requiring PC and Mac remote connectivity. Shiva's LanRover/E also works with Unix workstations. (Cayman Systems declined to have its GatorLink server evaluated, as the company is currently reassessing its product line.)

Most ARA servers are stand-alone devices that include a single processing unit, two or more serial ports, and a network-connection option (such as 10-BaseT). Apple's server is a NuBus card that contains four ARA serial ports. These cards can be dropped into any Macintosh that supports 12-inch NuBus cards (the Macintosh II series, all Centris and Quadra Macintoshes but the 610 and 660AV, and all Power Macintoshes but the 6100). Novell's product is a software

Netware Loadable Module (NLM) that must be loaded on an existing Netware file server that must be (that must be running version 3.11, 3.12, or 4.01 of Netware). The products vary in the number of ports (offering from two to eight ports in base units), ease of configuration, special features, and, of course, the speed they provide for text or graphics file transfers.

Top ARA Servers

Among a good crop of servers, Asanté's Net-Connect Remote Access Server (left) stood out for its strong performance and mixed-network capabilities. Apple's easily expandable ARA Multiport Server (middle) represents a fine choice for AppleTalk-only networks. Shiva's Lan-Rover/E (right) offers the easiest-to-use management software.



Server Performance

We looked at the two key aspects of server performance: the rate at which a highly compressible 1MB text file and a less-compressible 1MB EPS graphics file are transferred from an ARA client to an AppleShare file server on an AppleTalk network.

The key performance factor in ARA servers is the rate at which the server compresses or decompresses data. ARA works by compressing data at the CPU level, transferring it via modem over phone lines, and then decompressing it at its final destination—the remote user or a server. Text files are easy to compress, leading to shorter transfer times but requiring more CPU horsepower.

Performance is always important, but it becomes critical when remote users access all server ports simultaneously. Therefore we tested the servers configured for a single-port connection, as well as in two-to-four-port and, where applicable, eight-port configurations to determine data-transfer rates at various levels of CPU usage. (The APT and Global Village units were tested at their capacity—three ports and two ports, respectively.) We found that at maximum port usage some servers' performance suffered drastically, while others maintained a throughput rate similar to that of the single-port test (see "How Fast Are the ARA Servers?").

In the single-port EPS tests, all servers

performed similarly, with only a slight difference separating the fastest and slowest units. In the single-port text trials, however, Novell's Netware Connect joined Asanté's NetConnect in the lead, and this time they completed the task in about two-thirds the time needed by the slowest performer, the Global Village server.

For the four-port text test, Novell, Asanté, and Apple came close to their sin-

gle-port performance. Shiva drops down in performance, taking a little more than twice the amount of time of the best performer, Novell. Webster was well behind the pack. The four-port EPS trials yielded similar results, except that Shiva held up much better, finishing within a few seconds of the leader, Novell, as did Asanté and Apple.

The most telling test involves measuring data throughput when all server ports are accessed simultaneously. This measures how proficient the processor is at juggling data across many remote connections and how fast the processor can decompress large streams of data.

Comparing performance on the EPS file test, and using the maximum number of ports for each server, Apple and Novell, each with eight ports, came out on top, separated by just three seconds. The Global Village unit, with only two ports, Asanté's eight-port device, and APT, at three ports, finished in a pack just below the leaders. The Shiva finished far behind. In the text-file test, Novell finished ahead again, this time shaving about 15 percent off the time of the next finisher, the Apple unit.

Performance differences are due to the different processors used in each server as well as the firmware that controls the processor. Asanté's stellar performance, by far the best among the stand-alone

units, derives from its fast RISC processor. In contrast the Webster Multi-Port/LT Router relies on a slower Motorola 68331 processor.

Both Novell and Apple use the CPU of the host computer to do most of the work. A dramatically faster host will boost performance dramatically. With Novell's Netware Connect these processors can range from a 386 on up to the fastest Pentium; we used a 66MHz Gateway 2000 486DX2. The ARA Multiport Server can be plugged into any Mac that can handle 12-inch NuBus cards. For our test we used a 25MHz 040 Centris 650. So in a head-to-head comparison, the significantly faster Gateway host certainly accounts for the slight performance superiority of the Novell server. Faster Macs would undoubtedly raise the Apple unit's performance above Novell's.

What represents satisfactory performance for your network? Consider how often all ports will be accessed simultaneously and just what kind of data will be passed through them. If your needs are primarily for E-mail, slower servers will be far less noticeable than if you must constantly transfer massive graphics files.

Hidden Costs

Fortunately, you do not have to sacrifice speed to save money: the top performers are also competitively priced. But you should look beyond mere price and performance in choosing the server that best fits your needs.

First determine how many users will require remote access and how often they'll need it. This should suggest how many ports you'll want to purchase. Next determine the per-port cost of your ARA solution. Start with the ARA Server as your base, then add on any elements needed to bring your server to life, such as modems, ARA client software, and peripheral equipment such as expansion cards and cables. See "ARA Features at Your Service" to determine who offers what. A 14.4-Kbps V.32bis modem will cost between \$150 and \$300. The ARA 2.0 client software has a street price of \$55.

The stand-alone products from Asanté, Shiva, APT, and Webster fall within \$100 per port of each other—at a little over \$500 per port on average. The only additional hardware required for these servers are the modems. Only Shiva pro-

vides ARA client software (version 1.0). The Global Village \$950-per-port cost includes modems but requires the additional \$55 per port for client software.

Three units add particularly valuable features. Asanté offers PC connectivity; Webster includes router capability; and Shiva bundles dial-out access in addition to Unix connectivity, and boasts a great interface. In contrast, APT doesn't provide much in the way of extras, and its mediocre performance certainly doesn't merit the \$565-per-port price tag.

The Apple and Novell products require a host computer, making per-port price calculations tricky. These units are cost-effective only when integrated into new or existing file or mail servers; if you must purchase a dedicated computer the per-port cost jumps well beyond any other product in this feature. In that case you'd be better off selecting one of the stand-alone units.

The Apple ARA Multiport Server starts out at \$1799 for four ports. This includes the NuBus card as well as software for four ARA 2.0 clients. Additional four-port expansion cards can be ordered for \$1499. Each expansion kit comes with four 2.0 clients.

Configuring a PC for Novell's Netware Connect requires the purchase of a serial communication card and cable in addition to the modems. This expansion card increases the number of serial ports on the PC running Netware. (Most PCs come with two serial ports.) The serial card and cable will set you back between \$300 and \$900, depending on how many ports you buy. (We used an eight-port model from Digiboard in our tests.)

Configuring the Connection

After speed and cost per port, ease of use should be your next buying concern. Compared with most networking products ARA servers are easy to configure and manage. Just plug in and configure some modems, hook up your network, and add clients. ARA can only use a modem's straight-through data rate, so you'll need to shop wisely to find a product that doesn't use data compression to achieve a higher transfer rate. Considering the current prices of modems, a 14.4 V.32bis modem should be your bottom-line selection for the server.

Make sure your modem vendor provides a CCL (Communication Control Language) file to configure the ARA server. If the modem includes no CCL file, contact the vendor's technical-support department to order one.

The easiest ARA server to install was Global Village's OneWorld. It has Global Village PowerPort Mercury modems

built in (19.2 Kbps). Just plug in the phone lines, the power cord, and the network connection; you're ready to go. (This all-in-one approach is also offered by Shiva, with its recently released LanRover/Plus; and by the time you read this, Dayna should be shipping a similar product that also includes Mac-to-PC connectivity.)

The Global Village administration software provides an intuitive interface for setting up users and configuring the server. Excellent documentation offers step-by-step instructions. In a welcome convenience, OneWorld allows administrators to import user names from AppleShare users-and-groups files, Shiva Net Manager configuration documents, or preexist-

ing OneWorld configuration files.

The Shiva, APT, and Webster servers require external modems, so you must configure the server with the correct CCL file. Shiva's configuration and management interface, Shiva Net Manager, is far easier to use than the others. I configured the ports and users in a matter of minutes without looking at the manual.

Installing Apple's ARA Multiport server involved plugging in two NuBus (four ports each) cards and installing management and administration software on the host Mac. Users can be imported from existing AppleShare Users and Groups files as well. One problem: the Multiport server cannot be configured over the net-

ARA EXTRAS

Apple Remote Access is a simple product designed to maintain easy and secure remote connections to a network. Several companies offer products that complement the ARA environment, both on the client side and the server side. These are among the most important add-on products.

Timbuktu Pro From those pioneers in remote connectivity, Farallon Computing (514/814-5000), comes Timbuktu Pro (\$199). This application takes ARA all the way by providing screen-sharing capabilities as well as file-transfer options not available with ARA alone.

In addition, Timbuktu Pro can save your ARA-Timbuktu connection as a Timbuktu Pro connection document, which can be launched from the Finder for easier access to your network.

ARACommander 2.0 This powerful control panel, \$35 from Trilobyte Software (513/777-6641), builds on the functions of the ARA client. Its main

selling point is the ability to create automated network-connection sequences that appear as desktop icons. ARACommander works with both ARA 1.0 and 2.0 clients.

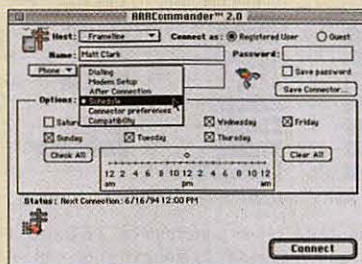
ARACommander can also dismount volumes and sever the ARA connection after a specific task, such as a large file transfer—saving on phone bills. Other features include automatic launching of applications at the remote network volume, redialing, phone books, and scheduled connections.

ARACommander includes ARAScripter—a utility for programming ARACommander features. In addition, it fully supports AppleScript.

SecureID Security Dynamics (617/547-7820) elevates server security to a higher plane. SecureID, a hardware device, works in conjunction with your ARA server to screen remote clients.

When remote users dial in, SecureID prompts them for a personal identification number (PIN). Remote users then use a credit card-size SecureID card with an LCD display to generate an additional number that must also be logged in. This number changes at preset intervals and corresponds to an algorithm located on the server.

SecureID's only drawback is its price. Setting up a server with access for ten users costs \$1950 if purchased for the Shiva LanRover/E and the Apple ARA Multiport Server. With other servers, you must purchase a special hardware device that sells for \$650 for 1 port, \$3800 for 4 ports, or \$12,520 for 16 ports. In all cases, each user needs a SecureID card (\$62).



Automated Connection ARACommander's schedule feature establishes a remote connection at preset intervals. This is helpful when gathering E-mail or performing an unattended remote backup.

work, while others can. A copy of Timbuktu's screen-sharing application (\$199 from Farallon, 510/814-5000) easily remedies this lapse, however.

Asanté's server is the worst offender, with nothing more than a command-line interface to configure the server. It also cannot import user lists, so the task of entering users for a large site becomes somewhat onerous. But to Asanté's credit, its documentation for this interface is clear and concise. For an extra \$250, it's worth buying Asanté View for ARA server monitoring and management. This elegant interface offers a wealth of information on traffic statistics, plus easy ways to configure modem scripts and track user access and error logging. Too bad they don't make their standard interface.

The Asanté unit does not subscribe to the standard ARA way of configuring modems, using the CCL files. Instead Asanté has chosen to write proprietary modem scripts, which it claims brings more control over the server. Asanté currently supports most of the popular modems, and the company will write a custom script for an obscure modem for an additional \$150.

Novell's Netware Connect (which comes with license options for 2, 8, or 32 users) is also easy to set up—even for the novice Netware user. The Netware Connect Network Loadable Module is installed over a Netware server.

ARA 1.0 versus 2.0

Another key element to configuring your system is assigning the correct Apple

Remote Access version number. The two ARA protocols, 1.0 and 2.0, are incompatible; and each comes with its own client version. The ARA 1.0 client comes bundled with the Shiva LanRover/E, while Apple bundles the ARA 2.0 client with its ARA Multiport Server. All other vendors make you purchase the client software separately.

ARA 2.0 is worth insisting on, whatever server you buy. The ARA 2.0 protocol allows remote users to change passwords; plus it gives administrators the option to force users to change passwords at preset intervals to ensure better security. In addition, the ARA 2.0 protocol can be used with third-party security products (see "ARA Extras"). ARA 2.0 also provides MNP 10 error correction (if it's available in the modem) for use over noisy phone lines, most commonly found with cellular modems.

There are other reasons to go with 2.0: the ARA 1.0 client complies only with the 1.0 protocol and cannot be used with a 2.0-only server, while the 2.0 ARA client can be used with a server that accepts either protocol.

The Apple Remote Access 2.0 client also includes new features such as Dial Assist, which makes international and credit card dialing easier by preconfiguring your connection document.

At press time Apple's server is compatible only with the 2.0 protocol; this means that if you purchase the Apple product you must upgrade all clients to 2.0. The Webster, Global Village, and Shiva products work with either protocol

ARA Features at Your Service

	Apple Computer
Product	ARA Multiport Server
Phone	408/996-1010
Toll-free phone	800/776-2333
ARA protocols supported	2.0
Number of dial-in ports	4 ^a
Network protocols supported	AppleTalk ^d
Modems included	no
Network interface options	10BaseT, LocalTalk, thick, thin, Token Ring ^e
List price ^c	\$1799 ^h
Dial-in options	Mac
Dial-out options	no
Configuration and management options	in band

^a The LanRover/Plus includes 4 or 8 internal modems; total cost \$6499 or \$8499, respectively. ^b Expandable to 16 ports. ^c Expandable to 64 ports with additional hardware.

^d Includes any protocol that can be tunneled through AppleTalk, such as TCP/IP. Tunneling through AppleTalk requires gateway software and/or hardware at both ends of the connection. ^e Depends on host machine's capabilities. ^f Cannot be used simultaneously. ^g Add \$55 per client (street price) for client software, except for Shiva and Apple

so that remote users don't need to worry about which client they're using. All other servers can accept only the 1.0 protocol, though most have announced plans to upgrade in the near future to include 2.0 compatibility, so this shouldn't be a major buying factor.

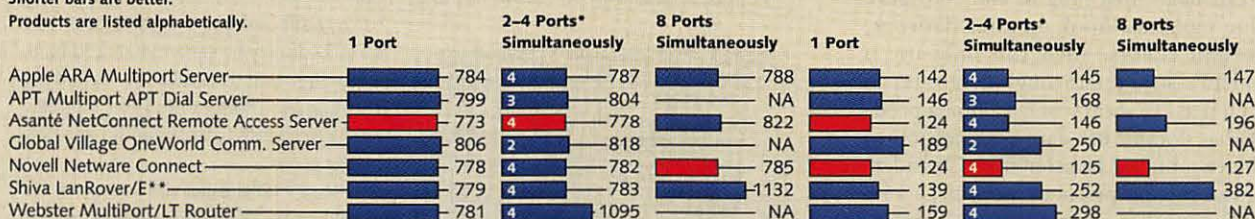


How Fast Are the ARA Servers?

Best result in each category. Shorter bars are better. Products are listed alphabetically.

EPS FILE TRANSFER

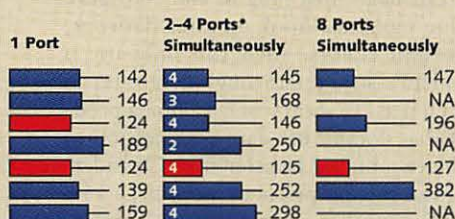
Time (in seconds) to transfer a 1MB EPS file through



*Number of ports is indicated by the white number in the bar. **Tested with Shiva Net Manager 2.0, shipping at the time of testing.

TEXT FILE TRANSFER

Time (in seconds) to transfer a 1MB text file through



BEHIND OUR TESTS

To measure ARA server performance, we timed the transfer of both text and EPS graphics files over an ARA connection between remote clients and an AppleTalk network. Using a HyperCard stack, we transferred a 1MB text file and a 1MB EPS file from the remote clients to the server ten times and averaged the outcome. (Each server was tested in a one-port configuration, a two-four-port configuration, and an eight-port configuration if available.) The network consisted of eight AppleShare 4.0.1 servers (Centris 650s with 8MB of RAM and Apple

230MB hard drives, except the Novell unit, which used a Gateway 2000 486DX2) in addition to the ARA server being tested. The remote clients were Mac IIci's with 8MB of RAM and Apple 80MB hard drives. We used Hayes V.32bis Optima 14.4 Kbps modems for the server (except for the Global Village product, which required its own internal PowerPort Mercury modems) and Supra FaxModem V.32bis modems for the clients.

—Macworld Lab testing supervised by Matt Clark

APT Communications	Asanté Technologies	Global Village Communication	Novell	Shiva Corporation	Webster Computer Corporation
Multiport APT Dial Server	NetConnect Remote Access Server	OneWorld Communications Server	Netware Connect	LanRover/E ^A	MultiPort/LT Router
301/874-3305	408/435-8401	415/390-8200	801/429-5588	617/270-8300	408/954-8054
800/842-0626	800/427-2683	800/736-4821	800/638-9273	800/458-3550	800/457-0903
1.0	1.0	1.0, 2.0	1.0	1.0, 2.0	1.0, 2.0
3	8 ^B	1 or 2	2 ^C	4 or 8	4
AppleTalk ^D	AppleTalk ^D , IPX, PPP	AppleTalk ^D	AppleTalk, IPX, NASI, TCP/IP	AppleTalk, IPX, LLC, NetBEUI, PPP, SLIP, TCP/IP	AppleTalk, DECnet, SNMP, TCP/IP
no	no	yes	no	no	no
10BaseT, thick, thin	10BaseT, thick, thin	10BaseT, LocalTalk ^F	10BaseT, thick, thin	10BaseT, Ethernet, thick, thin	10BaseT, LocalTalk, thick, thin
\$1695	\$3899 ^I	1 port \$1199, 2 ports \$1899 ^I	\$595 ^K	4 ports \$2899, 8 ports \$3999	\$1995
Mac	Mac, PC	Mac	Mac, PC	Mac, PC, Unix	Mac
no	no	no	PC (Netware client) ^L	Mac, PC (DOS, Windows), Telnet	no
in or out of band	in or out of band	out of band	in or out of band	in or out of band	in or out of band

products. ^A A 4-port expansion kit costs \$1499. ^I Upgrade costs: 8 ports \$2175; 16 ports \$6125. AsantéView Management software is \$250 extra. ^J \$1199 for single line, LocalTalk-only version (includes one PowerPort/Mercury Modem); \$1899 for 2-port Ethernet/LocalTalk version (includes two PowerPort/Mercury modems). ^K Also requires \$300 to \$900 serial-port card. Upgrade costs: 8 ports \$2195; 32 ports \$5995. ^L Achieved with off-the-shelf terminal-emulation/communications program via the NASI protocol.

Beyond ARA

Most ARA vendors provide additional features to complement ARA's basic capabilities. The most critical extra: the ability to use different protocols on your ARA server, such as IPX and TCP/IP. This facilitates remote access to mainframe, Unix workstation, and DEC servers. All servers accept the AppleTalk protocol, which in itself can tunnel (or encapsulate one type of data packet within another to travel over an incompatible network) other protocols such as TCP/IP and DECnet. This requires additional software and sometimes hardware at both ends of the connection. Shiva beats all others by a wide margin by providing native access to seven protocols running across Mac, PC, and Unix platforms.

Another outstanding benefit provided only by Shiva: it permits Macs to dial out from the network on the ARA server. This gives users the ability to select the ARA server in the Chooser and use the modems attached to dial online services. Dial-out access is configurable on an individual port basis to minimize conflicts that may arise when remote users can't access the server because of an outgoing call.

The Webster MultiPort/LT Router can function as a LocalTalk-to-Ethernet router in addition to providing ARA access. Each of its four ports can be individually configured for routing or ARA

duties—but can't perform both services simultaneously.

Asanté, Novell, and Shiva all provide PC connectivity capability for Novell networks. They also allow Macs to dial in to those networks, but you must still have the Mac Netware Loadable Module running on your Netware file server for remote Macs to see them. All of these products provide the dial-in client for PCs. The Shiva LanRover/E also accepts remote connections from Unix machines dialing in with an IP package.

The Last Word

Among the servers we tested, each has its redeeming aspects. If you're thinking of expanding your existing network hardware infrastructure, both the Apple ARA Multiport Server and Novell's Netware Connect offer outstanding performance while integrating well into existing server CPUs. For AppleTalk network administrators the Apple server holds a clear advantage due to its easy installation and superior interface.

For servers with four or fewer ports, the Webster MultiPort/LT Router provides versatility to small networks requiring both an AppleTalk router and ARA access; you can dedicate two ports to ARA and two to LocalTalk routing. The OneWorld is a good choice for first-timers needing a small port count and easy installation.

For the eight-port, stand-alone models, Shiva's LanRover/E and Asanté's NetConnect Remote Access Server offer similar value. Asanté's performance gives it the nod, but Shiva's management software can't be beat. If your business environment calls for routine remote exchange of large files, then the Asanté server is the one to get. If ease of use and

an ultraconvenient management interface is top priority, strongly consider Shiva.

Whatever your selection, as your administrative headaches and user complaints begin to fade away, you'll be glad you made the move to an ARA server. **m**

Assistant editor MATT CLARK has been testing and working with networking and communications equipment for more than five years.

ARA SERVERS



Among closely matched products, two servers stood out with a superior price/performance ratio for their respective specialties.

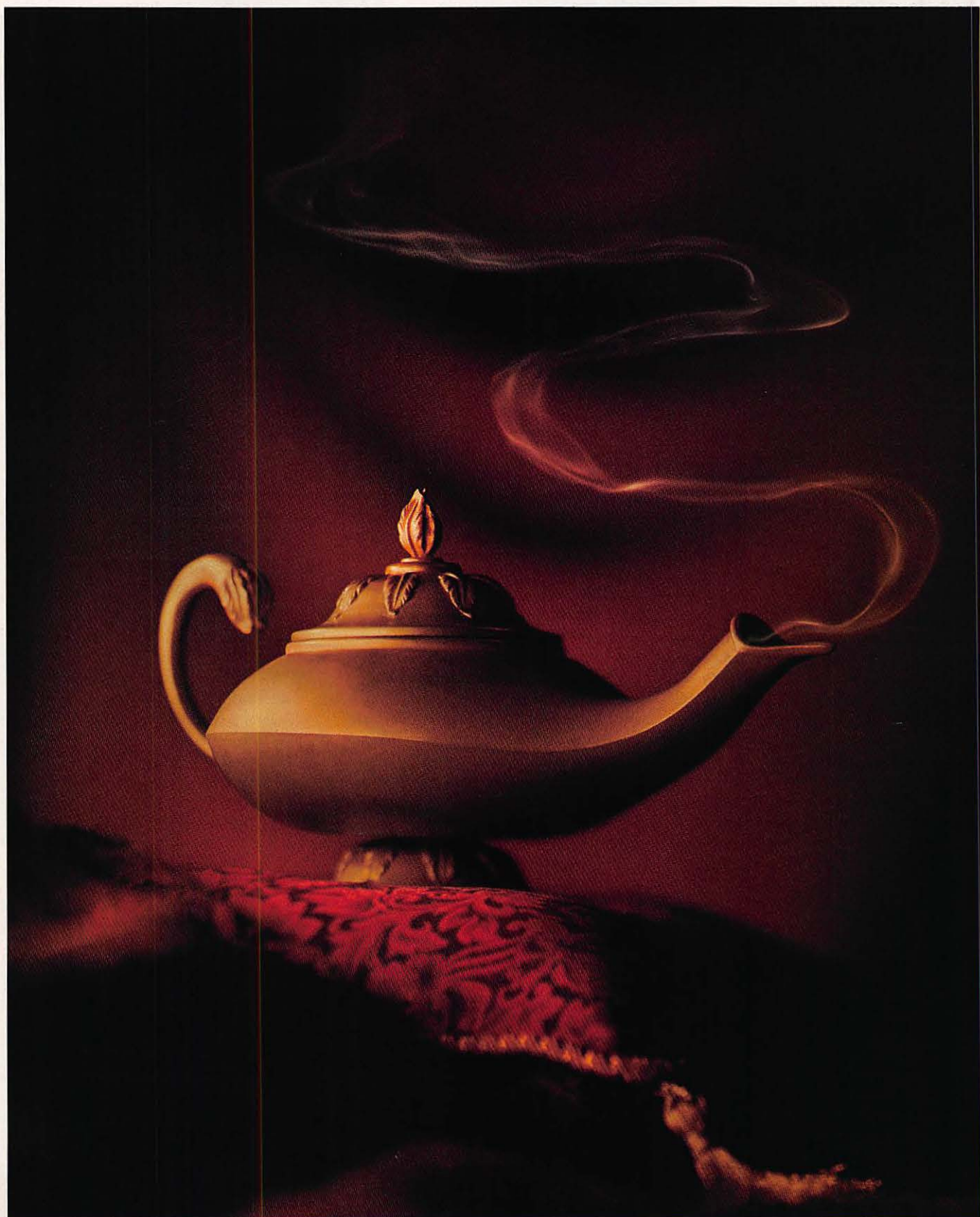
Mixed Networks

NetConnect Remote Access Server For mixed networks requiring PC and Mac connectivity this product offers a superb modular design and outstanding performance, and is easy to configure and use when paired with Asanté's optional \$250 interface. **Company:** Asanté Technologies. **List price:** \$3899 for eight ports.

AppleTalk Networks

ARA Multiport Server For AppleTalk-only networks this unit makes a great addition to an existing AppleShare file server. The ARA Multiport's expandability, performance, and easy-to-use, multifaceted management interface combine to create an outstanding remote-access tool. **Company:** Apple Computer. **List price:** Four ports \$1799; eight ports \$3298.

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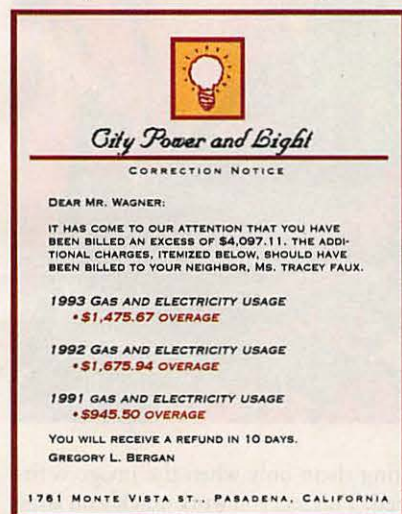
For those of you who ever wished that a computer could do more to

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This technological wizardry is also evident in something we call Table AutoFormat. To format tables, just point and click on any of the 34 different styles.

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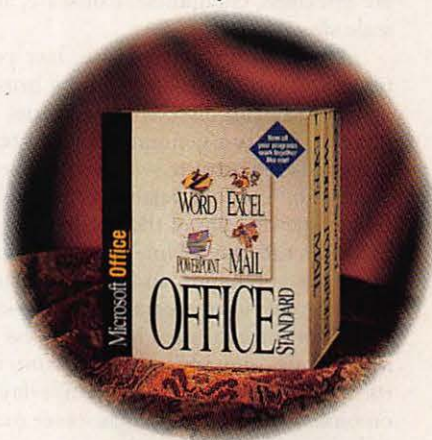
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Microsoft Office

Graphics

THE LATEST IN DESIGN, PUBLISHING, AND PREPRESS

Brushing Up Painter



AS THE FEATURE BATTLE between Painter and Photoshop heats up, Fractal Design is adding an arsenal of features to Painter 3.0, including multiple floating selections, powerful new brushes, color-masking and -adjustment tools, a redesigned interface using Dabbler's drawer metaphor (reducing 14 palettes to 6), and optimized PowerPC support.

Folded into 3.0 are all the compositing tools that made Painter X2 so appealing—including the ability to work with multiple floating objects, color sets, and masking brushes.

New brush technologies enable you to capture any shape or profile as a bristle pattern and save it as a new brush; physical bristle modeling gives artists control over the striation, number, and attributes of bristles. Also user-definable are thickness, clumpiness, hair scale, and scale size.

A new tool, Image Hose, lets you transform multiple objects into a brush, so you can paint directly with a series of images. You can generate random textures and tiled patterns—or turn a QuickTime movie into a pattern brush, with frames spewing out of the brush.

With full QuickTime support, Painter 3.0 lets you import and export movies. You'll be able to create frame stacks—sets of images you can either batch-process or manipulate individually with Painter's tools and then play back. A five-layer onionskin feature lets animators see multiple frames simultaneously.

Artists can make color-based selections and masks and adjust those selections based on hue, saturation, or value. Spot-color separations allow you to reduce a 24-bit image to one based on a limited color set.

continues on next page



DIANE FINSTER

xRes Challenges Imaging Leaders



XRES, AN IMAGE PROCESSING and paint program developed by Fauve Software for both Power Macs and 680X0 machines, combines a wide range of editing effects and highly customizable brushes with the ability to work quickly on large files in multiple layers with unlimited undos.

Because xRes splits images into smaller pieces—storing them mathematically as a network that contains both image and operational data—it will render parts of an image as you work, rather than storing all the manipulation commands and ex-

cuting them only when the image is finished. This lets you work quickly on large, high-resolution images (several hundred megabytes or more) with a minimum of RAM. Once an area is rendered, that part is done; the program doesn't have to waste time recomputing previously applied manipulations if, for example, you zoom in or do additional editing.

An xRes image can contain any number of objects, each on a separate layer with up to 32 sublayers, or channels. The Channels palette provides four modes: view, edit, alpha (masking), and clip (loading a selection).

Other palettes include Objects, Paper, and Filter, plus four brush palettes: Brushes, Brush Shape, Brush Options (opacity, spacing, smoothing, bleed, *continues on next page*

"PAINTER" continued

Due in October, Painter 3.0 has a suggested retail price of \$499; version 2.0 owners can get the upgrade for \$149, owners of 2.0 and Painter X2 pay \$99, and those who bought 2.0 after July 15 pay only for shipping and handling. Fractal Design, 408/688-5300.—CATHY ABES



Among Painter 3.0's new features are the Image Hose, which lets you paint with images; the Color Wheel; and dynamic palettes that change to reflect the tools you're using.

Radius Revs the Photoshop Engine

IF ADOBE PHOTOSHOP 3.0 RUNNING native on a Power Mac still isn't fast enough for you, there's hope. Radius has announced PhotoEngine, a 7-inch NuBus card containing four digital signal processors (DSPs) that accelerate selected Photoshop operations on a Power Mac by up to four times (the board also improves Photoshop performance on any Mac with a NuBus slot).

PhotoEngine, which is due to ship in late August with an expected retail price of \$1099, offloads the processing of approximately 25 Photoshop operations from the Macintosh's CPU and splits the processing between four 66MHz AT&T DSP3210 chips. By comparison, the majority of current DSP products, including Radius's PhotoBooster (\$999), divide the processing of common Photoshop operations between two DSP chips (PhotoEngine will eventually replace PhotoBooster).

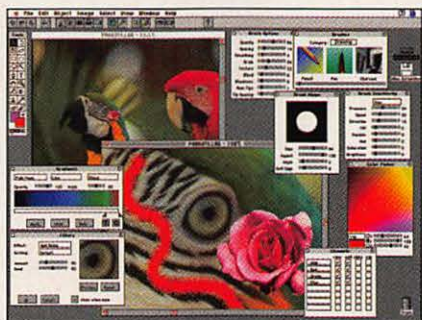
PhotoEngine accelerates such operations as RGB-to-CMYK conversion, on-screen CMYK display, and Scale and Skew, as well as Blur, Gaussian Blur, Sharpen, Unsharp Mask, Emboss, and Despeckle filters. PhotoEngine also includes 128K of static RAM, which improves DSP processing efficiency. Radius, 408/954-6403.—J.A.M.

"XRES" continued

grain, texture), and Brush Sensitivity (for modifying Brush Options or Brush Shapes settings; for example, to make brush size dependent on brush direction).

xRes includes a wide variety of tools and filters—such as resizing, rotating, skewing, cloning, and selecting by color—and the usual compositing modes, including Normal, Darker, and Lighter. Filters include Curves, Levels, Find Edges, Emboss, Motion Blur, Glowing Edge, and an interactive gradient picker. You can also apply filters from a series of preset, customizable macros.

You can work in RGB, CMYK, or gray-scale mode; the program lets you



Fauve Software's xRes lets you create and manipulate large, high-res images—such as this 75MB file—in real time with a minimum of RAM.

calibrate CMYK-to-RGB conversions and make color separations.

Supported file formats include TIFF, PICT, JPEG, TGA, GIFF, EPS-DCS (for output to QuarkXPress), and Photo CD. Version 1.0 doesn't support direct scanning or printing, but expect the next version (due within six months of 1.0) to do both. xRes requires at least 8MB of RAM; 16MB is recommended. Retailing for \$799, xRes is due to ship in mid-August. Fauve Software, 919/380-9933.

—CATHY ABES

Full-Bleed Printing for Less

GRAPHICS PROFESSIONALS LOOKING for a high-end color printer at a reasonable price may find it in Tektronix's Phaser 440, a letter-size dye-sublimation printer that—with a memory upgrade—can accommodate oversize sheets for full-bleed printing.

The Phaser 440 supports PostScript Level 2 and turns out 2 pages per minute. Fully networkable, the printer comes with parallel, serial, and AppleTalk ports (an Ethernet option is also available); all ports and Ethernet protocols are active

IN BRIEF

■ Your Own Private Utah

HSC Software's KPT Bryce 1.0 (\$199), named for Bryce Canyon, Utah, lets you generate 3-D landscapes and sky patterns and edit the program's dozens of preset patterns. With the Sky & Fog palette, for instance, you can create photo-realistic cumulus-cloud textures. 310/392-8441.

■ Power Tools for Power

Macs HSC Software is shipping KPT 2.1 with Color It (\$199). This native Power Mac version of Kai's Power Tools includes four new filters: Vortex Tiler, Gaussian Glow, Gaussian Electrify, and Gaussian Weave. 310/392-8441.

■ PhotoFlash News Flash

Version 1.1 of Apple PhotoFlash (\$279), currently shipping, is now optimized for Power Macs and directly supports images captured with the Apple QuickTake 100 digital camera. Upgrades are \$10. 408/996-1010.

simultaneously to handle cross-platform environments. Like other Tektronix printers, the Phaser 440 includes TekColor Photofine, which enhances the rendering of fine lines and text; and TekColor Dynamic Correction, a color-matching system for simulating color produced on different color-output devices.

The Phaser 440 ships with 16MB of RAM—enough for letter- and A4-size image processing and three-pass printing—and is expandable to 64MB. (Full-bleed and four-pass printing require an additional 16MB of RAM.)

The Phaser 440 is due to ship in early August with a base price of \$7995; the 16MB memory upgrade is \$1595. Tektronix, 503/682-7377.—CATHY ABES



For just under \$10,000, the Tektronix Phaser 440 dye-sub printer (with a memory upgrade) can output full-bleed color images on oversize sheets.

Let's talk scanners.

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Microtek brought the first halftone desktop scanner to market in 1984. Microtek was also responsible for the first 256-tone grayscale scanner, the first affordable desktop color scanner and the first affordable 35mm slide scanner. With the recent introduction of Dynamic Color Rendition (DCR), Microtek produced the

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Don't need color scanning capabilities? Then don't buy them. The Microtek ScanMaker IIG is a great 300 x 600 gray-scale scanner with a street price starting around \$400.

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Looking for a fast, single-pass scanner for office and graphic applications? The ScanMaker IISp is the winner of two important Editors' Choice Awards from *PC Magazine* and from *Imaging magazine*. It has software enhanced resolution of up to 1200 x 1200 and a street price of around \$750.

For more sophisticated applications, there's the ScanMaker IIHR.

You'll get software enhanced resolution up to 2400 dpi — which makes it very popular with



Microtek's Family of Scanners includes: ScanMaker III, ScanMaker IIHR, (both shown with optional transparency adapter), ScanMaker 45t, ScanMaker IISp and ScanMaker II.



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graphic artists — and a price of around \$1100, which makes it very popular, period.

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The ScanMaker III is a fast, single-pass flatbed scanner with DCR color calibration, software enhanced resolution up to 2400 dpi and a street price under \$2700.

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For real high-quality work, the ScanMaker 45t offers photographers and graphic artists up to 2000 x 2000 dpi software enhanced resolution for scanning transparent images up to 5" x 5". It costs about \$6500 and offers a level of quality that — until now — was only

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Microtek is the world's largest desktop scanner manufacturer. We've made more scanners, longer, and have a history of more scanner awards and innovations than anyone else you can name. And since we don't divide our attention between computers, printers and miscellaneous consumer products, we can concentrate on making the finest products in the scanning business. For your free copy of our scanning primer *The Scanned Image*, more information about scanners and Microtek in particular, just call us at 800 654-4160 or fax a request to 310 297-5050.

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Expert Graphics

GRAPHICS PROFESSIONALS SHARE THEIR SECRETS

by Cathy Abes

Artist: Wendy Grossman is an illustrator and fine artist based in New York City, where she teaches computer art at The School of Visual Arts. Her work has appeared in *Computer Artist* and *Computer Pictures*, and will be in a future issue of *Step-by-Step Electronic Design*.

How It Was Done: This image, titled *Egypt*, was done as a promotional piece for the artist's portfolio. Grossman began with a pencil sketch, which she used as a template in Adobe Illustrator. In Adobe Photoshop, she drew clipping paths for some of the graphic elements—such as the hieroglyphics, the Egyptian gods, and the other figures—and exported them to Illustrator as separate files to colorize and add to the final Illustrator file.

After finishing the Illustrator drawing and bringing it into Photoshop, Grossman created the scarab beetle and the palm trees in Ray Dream Designer. She used Ray Dream's Checkerboard shader for the tree trunks, and the Cactus shader for the leaves; for the scarab texture, she used Blue Marble. To make the sky textures—behind the pyramids and the sphinx—she used a texture generator called TextureSynth.

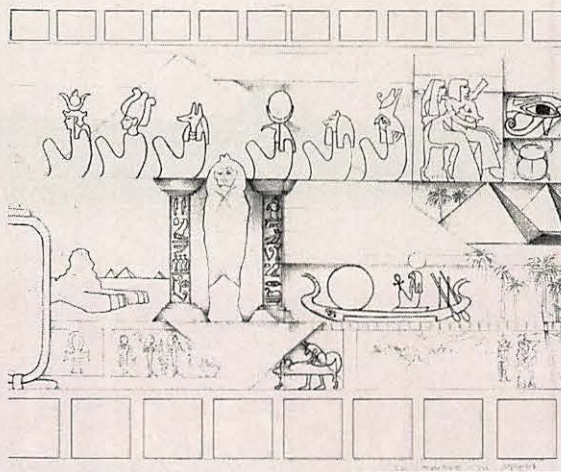
Back in Photoshop, Grossman began to assemble all the elements. The mummy was a scanned stock photo to which she applied the Dry Brush filter from Aldus Gallery Effects. After pasting the mummy into the main image, she brightened it with Levels. Next she "inversed" the selection and used the paintbrush to clean up the edges around the mummy. She created the dark edge along the right side and the triangular area above the feet using the airbrush.

For the columns, she used Gallery Effects' Bas Relief filter. To lighten the white areas and darken the shadow areas, she used the Dodge/Burn tool.

Grossman copied the blue hieroglyphic panel and applied Photoshop's Emboss filter to the copy; she then composited the copy with the original.

The final image was printed on authentic Egyptian papyrus. **m**

1 Grossman scanned in this pencil sketch and used it as a template to create a basic drawing in Illustrator.



2 A small section of the Illustrator file—the mummy and the columns—after it was opened in Photoshop.



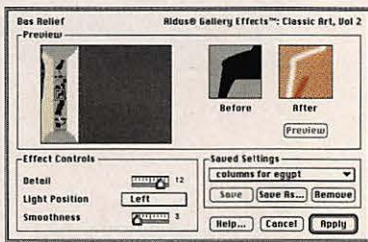
3 The stock photo of the mummy, to which Grossman applied the Dry Brush filter with Brush Size set to 2, Brush Detail set to 8, and Texture set to 1.

4 After pasting the mummy onto the background using Composite Controls in Luminosity mode at 100 percent opacity, she used the Levels command to increase the brightness.

THE TOOLS

Hardware: Quadra 700 with 20MB of RAM and 520MB internal hard drive; Seagate 1.5GB external drive; APS 44MB SyQuest removable-cartridge drive; NTR laser printer; Apple 14-inch color monitor.

Software: Adobe Illustrator 5.0; Adobe Photoshop 2.5.1; Aldus Gallery Effects filters Volumes 1 to 3; Kai's Power Tools 2.0; Ray Dream Designer 2.0; TextureSynth (by Joshua Jeffe, Pantechnicon, P.O. Box 738, Santa Cruz, CA 95061).



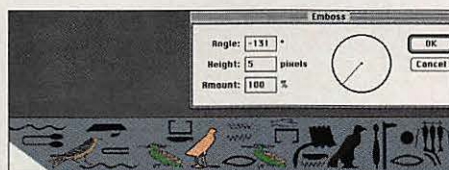
5 For the columns, she used Gallery Effects' Bas Relief filter with the following settings: Detail 12, Light Position left, and Smoothness 3.



6 The columns after the filter was applied. To ensure uniform shading on both columns, she applied the filter separately to each column.



8 After copying the panel to the Clipboard, she applied the Emboss filter (Stylize submenu), setting Angle to -131 degrees, Height to 5 pixels, and Amount to 100 percent.



7 The blue hieroglyphic panel was part of the original Illustrator file that the artist brought into Photoshop; she copied it to the Clipboard.



9 After applying the Emboss filter to the copy, and with the copied selection still active, Grossman pasted the original blue panel into the copy using Composite Controls in Color mode at 100 percent opacity.



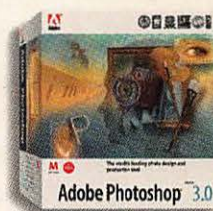
Here's the recipe. It begins with nine scanned images of restaurants, tables, chairs, a waiter, picture frames and a dinner to die for. Background layer ❶ holds master image. On another layer ❷, sections of two restaurants complete overall scene. Layer Masks are used to hide unwanted portions of image. Wine bottle shadow ❸ is extended using airbrush on Fade setting. Replace Color feature ❹ changes color of wine from red to white. Lighting Effects filter ❺ is used to reduce ambient light and add highlights that reflect multiple light sources. Color Range feature ❻ isolates waiter (originally shot against textured wall), and he is placed in the scene. Mirror images ❼ are copied to multiple layers where they are scaled, composed and further manipulated. Clouds filter ❽ creates window to outside world. Original photographs by Robert Mizon.

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Inside QuickDraw

GX

Fonts

A

utomatic glyph substitution is here! Thrilled, aren't you? Well, if you aren't, you will be: QuickDraw GX, Apple's long-awaited graphical extension to the Macintosh Operating System, supports an enhanced font architecture that infuses typefaces with a host of new capabilities. So read on: the following description of QuickDraw GX fonts—what they are, how they work, and what you can do with them—is certain to quicken the

pulse of any digital-type aficionado.

(At press time, Apple was expected to ship System 7.5, which includes QuickDraw GX, in September for about \$150. For more information on System 7.5, see "System 7.5," *Macworld*, September 1994. For a look at the other graphics capabilities QuickDraw GX offers—such as color matching, printing, and document portability—see "A Quick Look at QuickDraw GX," *Graphics news*, September 1994.)

A QuickDraw GX font is an outline font that takes advantage of Apple's QuickDraw GX imaging model, which provides new routines for manipulating graphics and type. Don't worry: GX is *not* a new font format—a GX font can be in either TrueType or PostScript Type 1 format—but rather a new technology that lets type developers add functionality to fonts. Your old PostScript and TrueType fonts will still work when the QuickDraw GX extension is installed; for a look at the mechanics of installing GX fonts, see the sidebar "How to Install GX Fonts."

The beauty of GX fonts is that typographic intelligence can be built into the font itself, rather than provided by the application in which the font is used. This technique allows even applications such as word processors and databases to offer advanced typographic features—if the application has been revised to make it GX-savvy (more on this later).

Before QuickDraw GX

In the current scheme of things, fonts are pretty much just collections of characters; what you do with them depends on the application you're using. With a word processor, you can specify type size, justification, leading, and so on. A page-layout program gives you precise control over typographic features such as kerning and tracking, while a graphics program might let you skew or rotate text, shade a letter, thicken an outline, and so on. If you're a sophisticated type user, you might augment a typeface with an expert set, a companion face that provides additional char-

APPLE'S OPERATING-SYSTEM EXTENSION PROMISES A WEALTH OF EXCITING NEW FONT CAPABILITIES

acters, such as small caps and fractions. If you want to customize such features as character width, weight, or optical scaling, you can buy a typeface that employs Adobe's Multiple Master technology.

On the other hand, QuickDraw GX lets font developers add typographic

instructions that perform many of the functions just described, without the need for specialized applications or supplementary fonts. A GX font can contain information about such features as tracking, kerning, justification, and weight or width variations. In addition, the font can

by Erfert Fenton

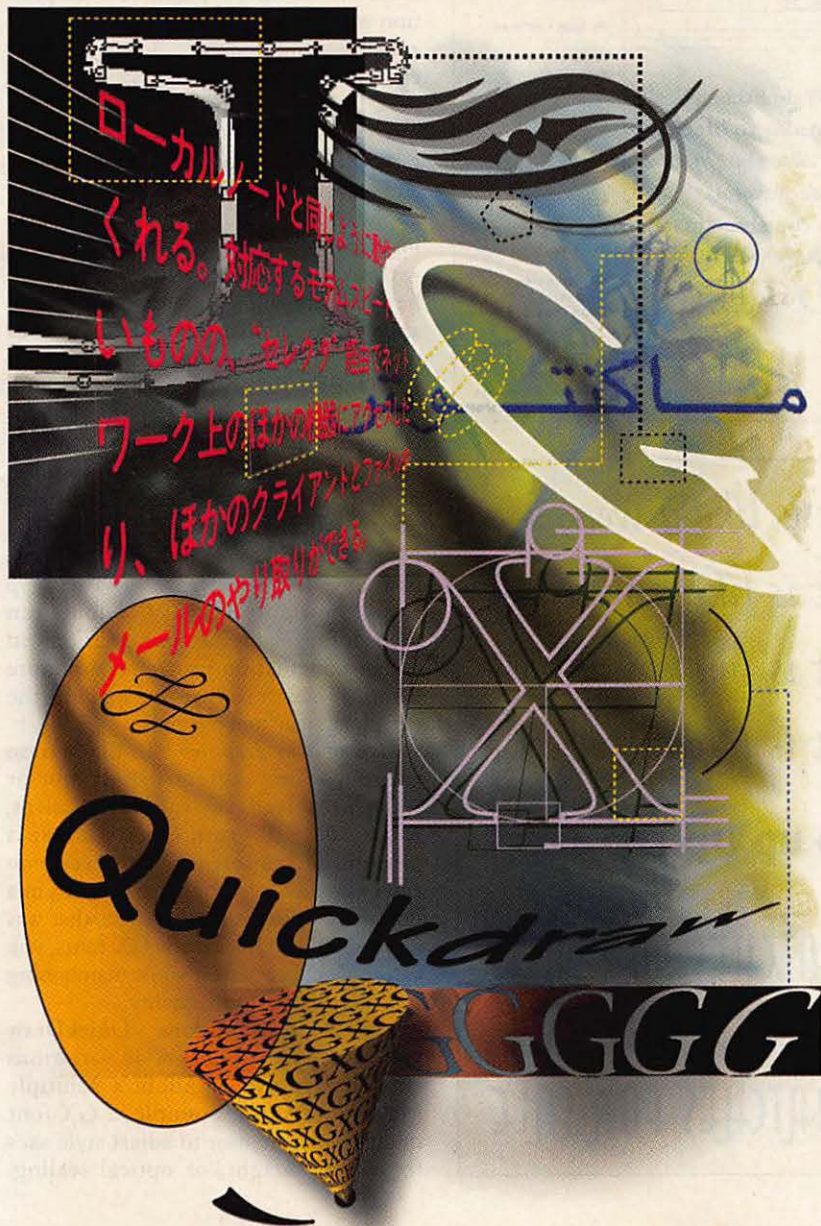
include thousands of additional characters, such as accents, symbols, ornaments, small caps, old-style numerals, ligatures, and more.

Wait a minute, you say, my keyboard doesn't have enough keystroke combinations to let me type thousands of characters. That's part of a GX font's charm: you don't have to use keystroke combinations to type special characters such as fractions or ligatures. Instead, you can turn typographic variations on and off as needed in a menu or dialog box.

For example, say you're typing the following sentence in your word processor, using the Adobe Garamond font: "To add flavor to grilled chicken, add 1/4 cup chopped garlic to the barbecue sauce and marinate for 30 to 45 minutes." If you work with type, you'll be familiar with the following problems and workarounds.

- The *T* and the *o* in *To* should be closer together. Too bad; your word processor doesn't support kerning.
- You'd like to use an *fl* ligature in *flavor*. You either type the ligature with the shift-option-5 keystroke combination (if you can remember it) or use the program's Change command to convert every *fl* letter combination to a ligature when the document is finished.
- You want to type 1/4 as a fraction. You mess around with superscript numbers, different type sizes, and the shift-option-1 keystroke combination, which produces a slash that's suitable for fractions. Or you create custom fractions in Altsys Corporation's Fontographer font-manipulation program. Or you buy the Adobe Garamond Expert Collection font, which includes fractions.
- You'd prefer to use old-style numerals for the 30 and 45, since they're more pleasing to the eye than numerals that don't fall below the baseline. You buy the Adobe Garamond Expert Collection, which includes old-style numerals.

With the QuickDraw GX version of Adobe Garamond (which is under development) and a word processor that supports GX fonts, you could type the above



sentence much more easily. You'd simply pull down a menu for Adobe Garamond and select Ligatures, Fractions, and Old Style Numerals. As you typed *f*, then *l*, the *fl* ligature would automatically appear. As you typed 1, a slash, and 4, the font would automatically generate a fraction. Old-style numerals would appear as well. If the font designer built a *T-o* kerning pair into the font, QuickDraw GX's type engine would apply the specified kerning, even in a lowly word processor. As another plus, because the *f* and *l* in the ligature are entered by typing *f* and *l* rather than shift-option-5, the word *flavor* will be recognized by spelling checkers. In addition, the word *flavor* will be intact—as opposed to *flavor*—if you change your text to a font that doesn't have the *fl* ligature. (See "The List Goes On," for an example of QuickDraw GX font capabilities.)

Feature-Rich Fonts

GX font designers have the tools to add a broad range of typographic enhancements to their fonts. Here's an overview of the features that a GX font can include:

- **Thousands of characters per font** Unlike today's fonts, which can include a maximum of 256 characters, a GX font can contain up to 65,000 characters. To be more precise, a GX font can include up to 65,000 *glyphs*, or character representations. While you might think of the letter *s* as a single character, that *s* can be represented by any number of glyphs. Depending on what options are selected, pressing the S key on your keyboard could produce a lowercase letter, an uppercase one, a swash, or a small cap. In each case, a different glyph is invoked for the letter *s*.

While a GX font *can* include 65,000

glyphs, 400 to 1000 glyphs is a more typical range for roman faces. Of course, there's more to typography than the Latin alphabet. The ability to place thousands of glyphs in a single font is a plus for creators of fonts for non-Latin character sets such as kanji, which consists of several thousand symbols.

- **Automatic glyph substitution** GX fonts go further than just adding alternate letter styles; the characters in GX fonts can be context-sensitive. An *s* at the end of a word could have a calligraphic flourish, for example, while an *s* in the middle of a word would not. Typing an *s* followed by a *t* could produce a ligature. As another example, with a font's Fractions option turned on, typing a number, then a slash, then another number would automatically generate a fraction.

Automatic glyph substitution can also be applied to non-Latin text systems such as Arabic, in which the appearance of a character changes depending on its position with respect to other characters.

- **Kerning and tracking** A type designer can place kerning and tracking instructions in a GX font. Since QuickDraw GX instructions operate at the System level, rather than the application level, kerning and tracking can occur in any GX-savvy application, rather than exclusively in high-end page-layout programs.

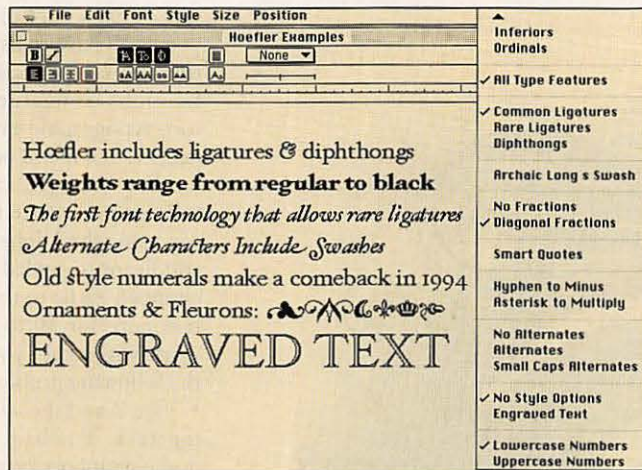
- **Optical alignment** Lines of text can be vertically aligned along a margin but appear crooked to the reader. A letter with a rounded edge, such as *C*, might be touching the same margin as a letter with a straight edge, such as *R*. Optical alignment moves the letters slightly so they appear to be aligned. A GX font can support optical alignment based on instructions included in the font. Similarly, punctuation that falls at the end of a line, including hyphens, leaves a visual gap along the right margin. GX fonts can incorporate hanging punctuation, in which punctuation protrudes a minute distance over the margin, making the margin appear more even.

- **Live text as graphics** In illustration programs such as Adobe Illustrator or Aldus FreeHand, you can stretch, slant, rotate, and skew text. Once the text is manipulated in this way, however, you can't correct a typo or delete a word in a line without negating the effect that was applied. With QuickDraw GX fonts, you can apply effects to text while maintaining full text-editing functionality.

- **Variable style options** QuickDraw GX fonts can support style variations similar to those of Adobe's Multiple Master fonts. For example, a GX font might allow the user to adjust style axes for width, weight, or optical scaling.

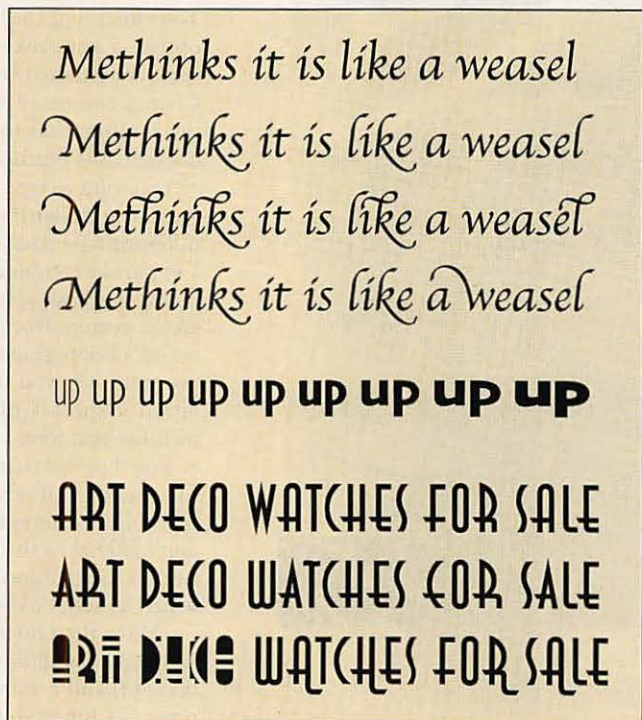
The List Goes On

Shown here are a few of the typographic options built into the TrueType GX font Hoefler, which is included with System 7.5. This text application, created by Apple to test GX fonts, gives you an idea of how a GX-savvy program might let you select a font's features.



Disparate Characters

QuickDraw GX fonts offer a wealth of design capabilities. Apple Chancery (top), for example, includes four design styles: Simple, Elegant, Flourishes A, and Flourishes B. Each style has its own set of swashes, ligatures, stylized letters, and other characteristics. If a program supports it, Skia (center) allows you to customize character weight, width, or both, by adjusting sliders. Bitstream's ITC Anna (bottom) offers four sets of alternate letter styles (here, the last line combines two styles).



■ What are QuickDraw GX fonts?

QuickDraw GX fonts are outline fonts—in either TrueType or PostScript Type 1 format—that can include typographic functions such as automatic fractions and ligatures, alternate character styles, optical alignment, and variable width and weight. Because a GX font can have as many as 65,000 characters, a single font can include charac-

ters formerly available only through an additional expert set. This expanded character set is also a plus for non-Latin fonts that include large numbers of glyphs.

■ Where can I get them?

System 7.5 includes five GX fonts. Adobe, Bitstream, Linotype-Hell, and Monotype also plan to offer them. (The word *Plus* after a font name indicates it is a GX font.)

■ What software and hardware is required?

To use a QuickDraw GX font, you need a Mac with at least a 68020 processor; 5MB of RAM with System 7.1, 8MB of RAM with System 7.5, and 16MB of RAM with System 7.5 on a Power Mac; and Apple's QuickDraw GX extension (included with System 7.5 and also available from vendors who license the extension

for inclusion with their products). GX fonts will work in a limited capacity with current applications, but to take advantage of alternate characters and other GX font functions, you'll need applications that are GX-savvy. Therein lies the rub. At press time, only two applications that fully support GX fonts—ReadySetGo GX and Pixar Typestry 2—had been announced.

Skia, one of the GX fonts included with System 7.5, allows the user to adjust character width and weight.

Guidelines for GX Fonts

Not every font will include all of the features just described. In some cases a font's design will dictate which features it includes. For example, a decorative face might not contain *fi* and *fl* ligatures, which are often found in traditional serif faces. Similarly, a modern sans serif design would probably have no call for swash characters, but might contain a set of alternate capitals or other letter variations.

In addition to practical and aesthetic concerns, grim realities such as time and budget constraints might shape a GX font's feature set, as GX font development is much more labor-intensive than development of traditional fonts. But what's to stop a designer from using GX development tools to create a font, then adding a couple of alternate characters and marketing it as a QuickDraw GX font?

With any luck, a group of font and application developers called the Font Consortium will prevent such an occurrence by defining what constitutes a GX font. Representatives from Aldus, International Typeface Corporation (ITC), Linotype-Hell, and around 20 other companies held their first meeting in the spring of 1994. (While Apple is not directly involved in the Font Consortium's decision-making process, an Apple representative did attend the initial meeting, and Apple supports the consortium's efforts to set guidelines for GX font character sets and features.)

According to Allan Haley, who chaired that meeting, developers were concerned that "nobody really knew what a GX font was; theoretically, you could make a font, put one ligature in it, and say 'Gee, I've got a GX font.'"

"Meanwhile, companies like ITC,

Bitstream, and Linotype were investing tens of thousands of dollars to develop full-blown, rich GX fonts," Haley added. "[With this situation,] customers wouldn't know what they were getting. We weren't attempting to create a gestapo standard that developers have to meet, but to establish a baseline character and feature set that all GX fonts probably ought to have. We're not trying to constrain anybody, because GX fonts are about letting designers be creative."

The Font Consortium is seeking input from concerned developers and hopes to publish a set of guidelines this fall. Meanwhile, designers at Linotype-Hell are working on a set of symbols to identify GX font features (small caps, swashes, variable weights, and so on). These symbols could be placed on font packages to let buyers know which features were supported by a given font.

Defining the characteristics of a GX font is only one of the Font Consortium's concerns. The other is cross-platform compatibility. While TrueType fonts are currently supported by the Macintosh and Windows operating systems, no such cross-platform capability exists for QuickDraw GX fonts, since QuickDraw is an imaging architecture particular to the Mac. Although the Font Consortium members have made it clear to Apple that they want cross-platform compatibility, it's unclear at this point what—if anything—can be done to accomplish that. Microsoft has shown no inclination to support GX font technology, and is reportedly considering creating its own extended character set for Windows.

What If They Gave a Font Technology and Nobody Came?

The lack of cross-platform compatibility, Apple's long delay in releasing QuickDraw GX, and an ever-present undercurrent of politics (primarily between

Apple and Microsoft) seem to have made application developers, at least for now, less than eager to support GX fonts. By late July, only one page-layout application—Manhattan Graphics' ReadySetGo—was slated to fully support QuickDraw GX fonts. Likewise, if you wanted to create some graphics or animations that took advantage of GX fonts, your buying decision would be easy: Pixar Typestry 2 is the only one that exists.

Quark, for example, has no plans to support QuickDraw GX. "Most of the functionality that QuickDraw GX offers is already built into XPress," according to Quark representative Peter Warren. "If you want to adjust kerning or rotate a word, you can do that in XPress."

According to Barbara Burke, PR program manager at Aldus, "We have not made any announcements or any commitment to support GX fonts" in PageMaker—a curious statement from a company that's actively involved in the Font Consortium.

And while several font companies have put considerable time and resources into developing GX fonts, others have some concerns about the new technology. "We've made a few GX fonts and think the technology is interesting," says Cynthia Hollandsworth, Agfa's type marketing manager. "But there are questions about the commercial viability of GX fonts. They offer a lot of potential for the informed user, but it's hard to get people to learn about type—it's difficult enough to explain Multiple Masters to customers. The type intelligentsia will love GX fonts, but we have to consider the broad market; there's such a thing as overengineering."

Hollandsworth has a point. One has only to look at the number of ads, book jackets, and other items that display straight quotes and other typographic faux pas to realize that the general user may not yet be ready for *more* features.

HOW TO INSTALL GX FONTS

Here's a quick overview of the GX font installation process.

To install QuickDraw GX and the GX fonts included with System 7.5, you run an installer program. The program automatically installs the QuickDraw GX extension and the Hoefler Text and Ornaments, Apple Chancery, Skia, and Tekton Plus fonts. The program also installs ATM GX, Adobe's GX-savvy version of Adobe Type Manager.

If you have existing TrueType fonts installed, they will work under QuickDraw GX. If

you have existing PostScript Type 1 fonts installed, the GX installer will convert them to a form that will work under QuickDraw GX. During the installation process, a message says "Enabling Type 1 fonts." When you look in your Fonts folder, you'll see a new entity: a single suitcase icon that holds both the screen and printer components of a PostScript font. (Your old PostScript fonts are conveniently archived in a separate folder, so you can easily reinstall them if you later decide to deinstall QuickDraw GX.)

The enabling process just described works only on fonts that are installed in the Fonts folder, the Extensions folder, or the System Folder. If you use a font-management utility—or if you need to install PostScript fonts after you've installed the GX extension—you must run a Type 1 font enabler from Adobe that's included with System 7.5.

(A spokesman for Adobe said the font-enabler utility shipping with System 7.5 is slow. Adobe has already revised the utility; the new version is available free of

charge on CompuServe, Adobe's bulletin board, and from Adobe directly. Call Adobe at 415/961-4400.)

To install a new GX font, simply drag it into the System Folder as you would any other font. PostScript fonts that are enabled to operate under QuickDraw GX will work just as they did under your previous System setup. They will not magically acquire any GX font characteristics such as additional characters; these must be provided by a font designer when a GX font is made.

Font Pioneers

Despite some well-founded skepticism in the industry, several digital-type foundries have been hard at work creating GX fonts. According to an Apple representative, 60 to 75 GX fonts should be available when System 7.5 and QuickDraw GX debut. Apple's System 7.5 package will include the following faces:

- **Hoefler** Designed by Jonathan Hoefler, this family includes Hoefler Regular, Black, Italic, and Black Italic, as well as Hoefler Ornaments. The fonts include old-style numerals, inferior and superior numbers and letters, fractions, ligatures, engraved characters, small caps, and ornaments.
- **Apple Chancery** Designed by Charles Bigelow and Kris Holmes, this lovely font is based on handwriting scripts developed during the Renaissance. The font has four design levels featuring different serifs, ascenders, descenders, and swashes. It includes old-style numerals, inferior and superior numbers and letters, fractions, ligatures, and fleurons.
- **Skia** This stylish sans serif face by Matthew Carter offers variable weight and width axes. It includes old-style numerals, inferior and superior numbers and letters, fractions, and ligatures.
- **Tekton Plus** A PostScript Type 1 GX font from Adobe, Tekton Plus includes accented characters, small caps, ligatures, superior and inferior numbers, fractions, and swashes.

In addition, here's a preview of what some font vendors are planning for QuickDraw GX:

- **Adobe Systems** (415/961-4400) will release six weights of Adobe Garamond, as well as Caffisch Script. Adobe Gara-

mond includes accented characters, small caps, ligatures, superior and inferior numbers, fractions, swashes, additional alternate characters, and ornaments. Caffisch includes swashes, ligatures, and old-style numerals.

- **Bitstream** (617/497-6222) and ITC, in conjunction with Galapagos Design Group, will release a number of GX fonts that consist of text, decorative, and script designs. The fonts take advantage of various QuickDraw GX features and character sets. The fonts include various weights and styles of Bitstream Amerigo, ITC Anna, Bernhard Modern, Bernhard Tango, ITC Charter, Bitstream Chianti, ITC Highlander, Bitstream Mr. Earl with Snowcaps, ITC Newtext, Bitstream Oranda, and ITC Studio Script.

- **The Font Bureau** (617/742-9070) is experimenting with GX fonts, but none had been released at press time.

- **Linotype-Hell** (516/434-2000) has created GX versions of the 35 standard Macintosh fonts, including Helvetica, Times, Palatino, New Century Schoolbook, ITC Avant Garde Gothic, ITC Bookman, ITC Zapf Chancery, and ITC Zapf Dingbats. Other GX fonts are in the works, including Electra, which has axes for optical scaling, and Bottlecaps, a whimsical decorative face.

- **Monotype Typography** (312/855-1440) has a number of GX fonts under development. No specifics were available at publication time.

- **Ares Software Corporation** (415/578-9090) has announced that users will be able to manipulate the master fonts in its FontChameleon program (\$295) in applications that have QuickDraw GX sliders for weight, height, and width (for a review

of FontChameleon, see *Macworld*, September 1994).

The Last Word

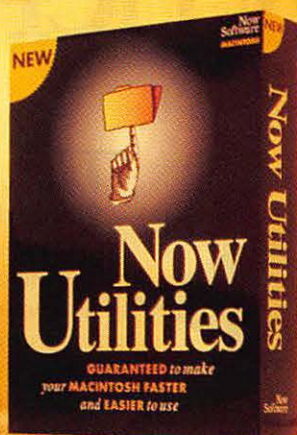
As you can see, there are plenty of QuickDraw GX fonts waiting in the wings. If only the same could be said for QuickDraw GX-savvy applications.

Meanwhile, what's a font connoisseur to do? For now, you can install the GX fonts that come with System 7.5 and get a glimpse of them in your current applications, but you'll only be able to use the standard 256 characters that are found in today's fonts (the fonts' QuickDraw GX features will be unavailable to applications that are not GX-savvy). Or, you can purchase Manhattan Graphics' ReadySetGo GX (\$395; 914/725-2048) or Pixar's Typestry 2 (\$299; 510/236-4000) when they're available later this year.

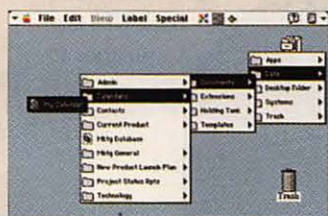
QuickDraw GX fonts offer an array of amazing typographic capabilities for sophisticated type users. In addition, the technology simplifies mundane type chores like setting fractions or adding ornaments—something almost any font user could appreciate. If I were you, I'd contact the developers of my favorite applications and ask them when they plan to support QuickDraw GX fonts. It would be a shame to see the promise of GX technology wither into an ex-technology simply because of a lack of applications that take advantage of it. **m**

Contributing editor ERFERT FENTON regularly covers type for *Macworld*. Among her past articles are "The Right Font," a buyer's guide to fonts (March 1994), and "Understanding Multiple Masters," a look at Adobe's type technology (September 1992).

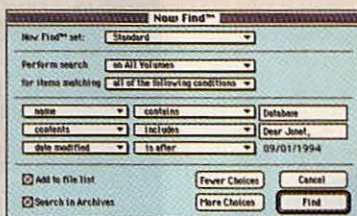
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August 1993
APC Back-UPS 1250

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APC Voted most reliable by 3-to-1

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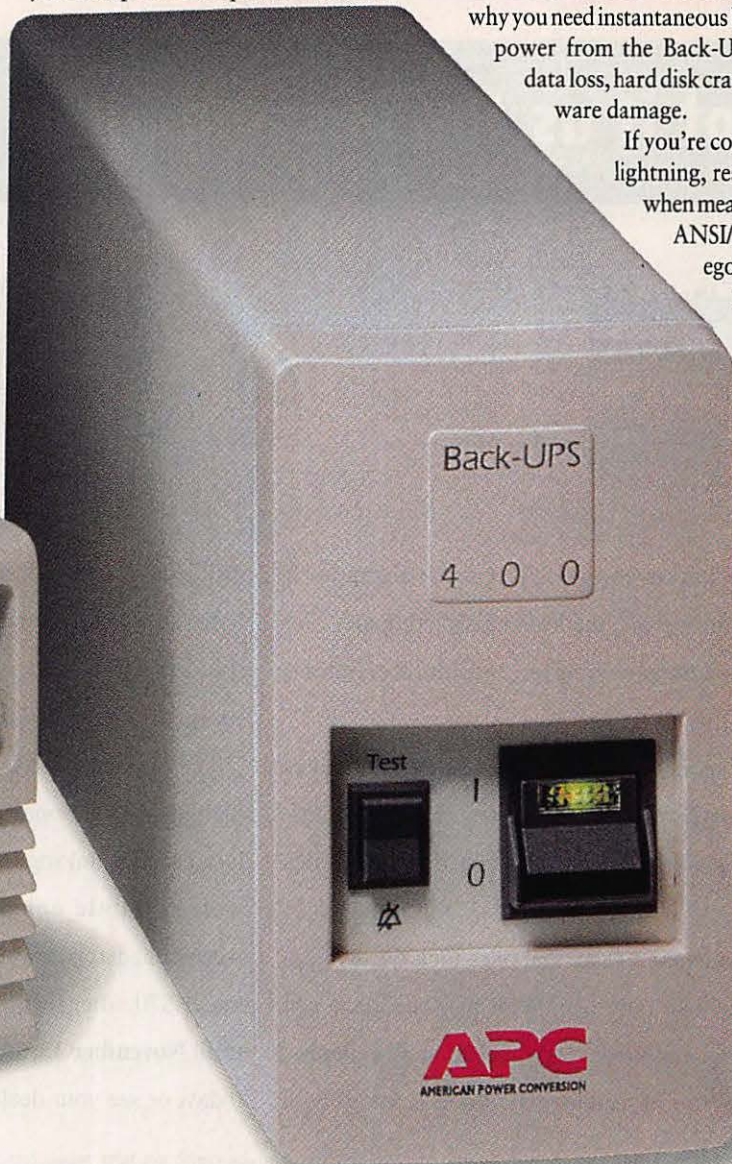
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Andrew Wargo, Manager at Baxter Land Company, tried two other brands before Back-UPS. "One lasted a few days, a second one went up in smoke after 48 hours, a third lasted less than 24 hours! I then bought my Back-UPS for less than half of what I had paid for the others. We've purchased three more Back-UPS and for the past 14 months they've been just hummin' away on the same power line that was eating the other brands alive!"

virtually all separate surge suppressors. Surge performance is even backed by a \$25,000 Lifetime Equipment Protection Guarantee.

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900	Multiple systems, longer runtime applications	\$599
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EDITED BY DAN LITTMAN

At Work

THE LATEST TOOLS FOR BUSINESS COMPUTING

WordPerfect's Groupwise: Beyond E-Mail

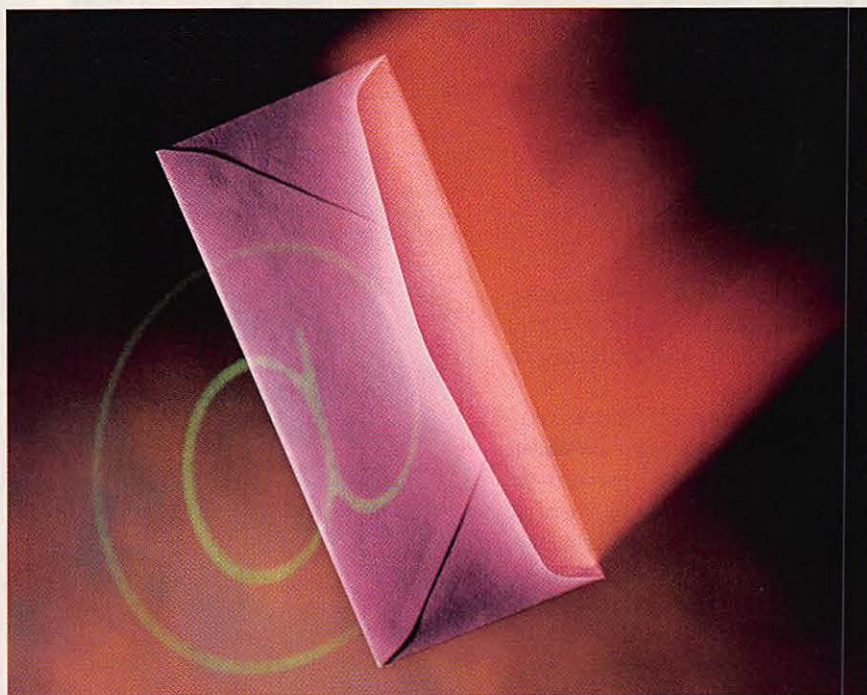


WHILE UPGRADING WORDPerfect Office, Novell subsidiary WordPerfect Corporation renamed the office-automation package

Novell Groupwise to distinguish it from the Word/Excel/PowerPoint bundle known as Microsoft Office.

Novell Groupwise provides calendaring and meeting scheduling, to-do list management, and other capabilities, but the real news in the new version, 4.1, is its extensive E-mail features. It provides BBS-like capability with forums that can thread messages and responses from many participants. E-mail can be routed to a series of recipients, with instructions on what each recipient is supposed to do before the message moves to the next person on the list. Also, Groupwise's E-mail can be controlled with a system of rules: for example, before going out of town you might set it up to forward messages from your supervisor to a colleague, and to send a response to all other messages with information about where you can be reached. For remote access, WordPerfect provides gateways to various portable, wireless delivery systems such as pagers; if you're caught somewhere without a portable anything, you can retrieve or send E-mail with voice annotations by telephone, similar to a voice-mail system, or even command a voice-synthesizer to read your text messages to you over the telephone. Groupwise is the platform for other WordPerfect workgroup applications: for example, requests for scheduling meetings, and electronic forms created and distributed with WordPerfect's InForms package, appear in the Groupwise in-box.

Groupwise was designed for mixed environments, and there is no Mac version of the Groupwise server. The Mac client, which should be available now in



WILL CROCKER

680X0 and native Power Mac versions, provides the same functionality as all other clients and costs \$695 for five users; pricing per user drops to \$95 for volume purchases. Gateways, voice synthesis, and other special features are extra. WordPerfect, 801/225-5000.—D.L.

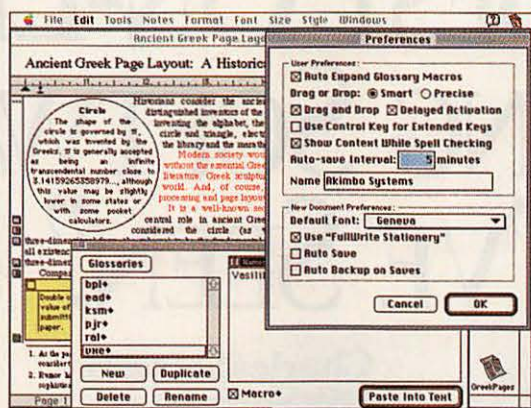
The Svelte FullWrite Unveiled

WHEN THE RELIGIOUSLY AWAITED Microsoft Word-killer FullWrite Professional finally shipped way back in 1988, about two years behind schedule, the faithful tolerated its many bugs but were scandalized by its outrageous hard-

ware profile: FullWrite demanded at least a megabyte of RAM to run. The program was soon lost in the morass leading to Ashton-Tate's demise, but now FullWrite has been resurrected by a new company and, at 1.5MB to 2MB of RAM, version 2.0 is almost PowerBook material for the 1990s.

Version 2.0 is a complete rewrite but retains beloved features from earlier versions, including "sidebars" (separate miniwindows that sit on a regular document and contain text or graphics), cross-referencing, and bookmarks (a way to create a list of places in a document you want to return to later). Big changes include an extensible architecture for third-party developers to add new features (and for users to strip them out—many standard features are extensions,

and thus removable). FullWrite publisher Akimbo Systems plans to ship about 100 extensions with version 2.0, including ones that provide extra print-merge options and keyboard control of menus, and the company swears other companies are hard at work on more. The glossary function has a macro capability that allows it to respond to typed text—for example, it can automatically correct common misspellings. You can mix outlines and nonoutlined text in the same document, and merge or split outlines from different places. Version 2.0 also provides change bars that show where text has been added or deleted. FullWrite 2.0 should be



FullWrite 2.0 can wrap text inside and outside objects, and the glossary can insert text strings when you type their abbreviations.

shipping now for \$395; upgrades from any version are \$99. Akimbo Systems, 617/776-5500.—D.L.

Simultaneous Interpreters

FOR U.S. BUSINESSES THAT NEED to correspond and conduct transactions in languages other than English, there have been only two alternatives for translating documents: send them out to a big-dollar hourly service, or keep people on staff with native command of the foreign languages needed. Computer translation technology is finally getting to the point where off-the-shelf software can take over at least some of the burden.

MicroTac Software is developing four low-cost packages for translation of English to and from French, German, Italian, or Spanish. MicroTak says that the \$99.95 Language Assistants perform reasonably well on clearly written, unambiguous text and are useful mostly for quickly converting foreign E-mail and business documents. They can translate a whole document at once, or go sentence by sentence flagging uncertain words or phrases for a person to correct; they cannot batch-process a series of documents.

The programs can open and save in Microsoft Word, MacWrite, WordPerfect, and ClarisWorks formats. MicroTak Software, 619/272-5700.—D.L.

OCR Goes Gray-Scale



VERSION 5.0 OF CAERE'S flagship optical character recognition package, OmniPage Professional, applies several new techniques to extracting text from paper documents, including using the gray-scale information collected by most scanners. This technique, which Caere calls 3-D OCR, analyzes not only the location but also the darkness of pixels to help determine which belong to a character and which belong to a blob of correction fluid, a coffee stain, or other artifact.

Version 5.0 uses a set of interlocking neural networks that each specialize in a particular problem—small type sizes, faxes, and so on—and pass the analysis chores back and forth as different problems are encountered. The system also analyzes recognized text for linguistic or grammatical clues to apply to unrecognized portions of a document.

Caere has built its image-manipulation program, Image

IN BRIEF

■ People before Projects

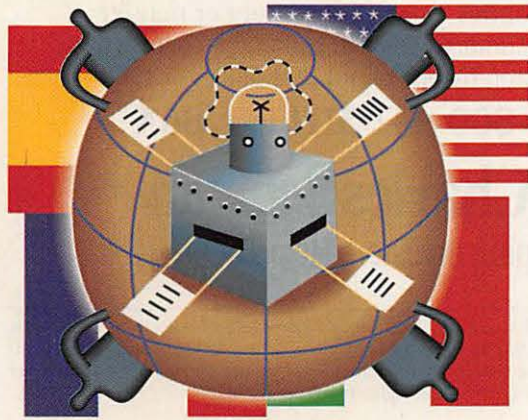
CFM Inc. believes project-management software is inappropriate for many modern organizations because it focuses on tasks to be performed instead of on the people who perform them. CFM developed TeamFlow as an adjunct to the company's business-process consulting work, and, at version 3.1, is just starting to sell the software separately. The program's gridlike layout shows the intersection between people and tasks in a workflow diagram that appears somewhat like a traditional project-management PERT chart, but that actually shows the relationships—in time, reporting structure, information transfer, complementary skills, and so on—between workgroup members. TeamFlow 3.1 should be available now for \$395. 617/275-5258.

■ Integrated Newton-

Works Avail Technology has developed an integrated package called TapWorks that provides a spreadsheet, graphing and drawing, a word processor, and page-layout functions for the pocket-size Newton computer. In addition, TapWorks can produce 8½-by-11-inch documents on the Newton's diminutive screen, and TapWorks provides a viewer, similar to that of Adobe Acrobat or Common Ground, which can be distributed with documents so that other Newton users can look at them. The text processor can combine handwritten and computer-generated text and has a glossary feature; the spreadsheet has more than 100 functions and a macro language. TapWorks lists for \$119 and should be shipping now. 408/730-6855.

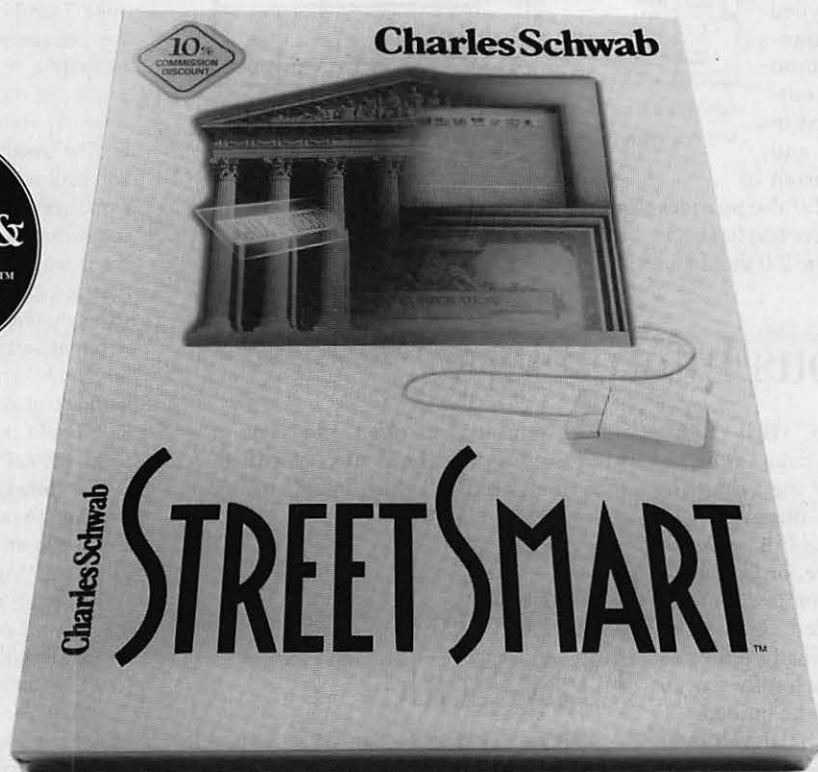
Assistant, into OmniPage Pro 5.0, so images that are scanned and saved with a document can be color-corrected or otherwise modified during the recognition process. The new version also sports a simplified interface.

OmniPage Professional version 5.0 should be shipping now with an installer that distinguishes between 680X0 and Power Macintosh systems and installs the right version. It lists for \$695. Caere, 408/354-7000.—D.L.



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BY JIM HEID

Working Smart

Is Your Mac Secure?

OVER TIME, YOUR MAC BECOMES A VERY personal thing, and I don't mean because of your Energizer bunny screen saver and Bullwinkle Trash icon. Your Mac is a personal thing because of the personal *data* it contains: financial records, business plans, lesson plans, résumés, love letters, hate letters.

These documents lie around on your hard disk for any passing colleague to read. Oh, you've buried them several folders deep, have you? Nice try, but all a snoop needs is a program that can search inside files for words like *budget*, *confidential*, or *romantic*—Microsoft Word's Find File command can do this, as can such utilities as Claris's Retrieve It.

In short, you need to know how to protect your data. A security program isn't a fail-safe guarantee against silicon spying but, like a burglar alarm, it can stop an amateur and slow down a pro.

Application Security Features

A few programs have built-in password protection, which may be all the security you need. With the latest versions of two Microsoft programs, Word 6.0 and Excel 5.0, you can password-protect a document to prevent anyone from opening it or to let people read but not alter it; you'll find the option in the Save dialog box. When you specify a password, both Word and Excel encrypt—that is, scramble—the file so it can't be read with a disk editor such as Norton Utilities.

To password-protect a Word or Excel file you've already created, you must use the Save As command to duplicate it. And don't forget to throw away the original, unprotected version.

WordPerfect for Macintosh 3.0 also provides password protection, and it offers a Preference setting (in the Preferences dialog box under Environment) to protect new documents automatically.

Most databases, such as ACI US's 4th Dimension and Claris's FileMaker Pro, let you set up individual and group access privileges for viewing or modifying files,

layouts, and even specific fields. (There are, however, some potential holes in FileMaker Pro's security scheme—see *Conspicuous Consumer* in this issue.)

Finally, some backup utilities, such as Dantz Development's Retrospect and Symantec's FastBack for Macintosh, can encrypt backup and archive files. Consider doing this if your backup media is stored away from your desk or off-site, as it should be.

Password-Protecting Partitions

One problem with application-specific security is that it's application-specific:

products were developed with good intentions, of course—to rescue files when people forget their passwords—but, like all technology, they're neutral about how we use them.

Guarding entire folders or disks is more secure. All hard drives include driver/formatter software, such as FWB's Hard Disk Toolkit (\$199.95; 415/474-8055), that can divide a drive into numerous volumes, or partitions, each of which appears on the desktop as a separate drive. Most of these utilities let you password-control mounting partitions. A password-protected partition is an ideal place

to store sensitive files—if you remember to drag the partition to the Trash when you're finished with it or step away from your desk. This is inconvenient. Worse, an experienced disk hacker can use a disk-editing utility to locate the password.

Locking Folders

There are many security utilities that lock individual folders. One such program, Kent Marsh's FolderBolt (\$129.95; 713/522-5625, 800/325-3587), isn't a kitchen-sink security package. It simply provides three options to control

access to folders: keep people out entirely, restrict them to read-only access, or let them add files but not open the folder. The good news about FolderBolt is that, unlike many security packages, it requires only minor adaptations to your work routine. To lock a folder, for instance, you just press the shift key while clicking on the folder window's close box, and a dialog box appears to assign a password (see "Under Lock and Key").

The bad news about FolderBolt and many other security packages is that they



WordPerfect can password-protect your business proposal, but not the electronic mail you exchange with colleagues about it. Application programs also tend to use encryption routines that work quickly but are easily cracked. As evidence, at least two companies sell utilities that extract passwords. AccessData Corporation's Wrpas (\$185; 801/224-6970, 800/658-5199) retrieves WordPerfect passwords, while the company's Xlpas (\$185) does the same for Excel. New Visions' MasterKey (\$185; 214/754-2524) works with both Excel and WordPerfect. These

continues

make minor alterations to a disk's directory, the file that acts like a table of contents to the files on the drive. Disk-repair packages such as Symantec Corporation's Norton Utilities for Macintosh, or NUM (\$149; 503/334-6054, 800/441-7234), will detect these alterations and report them as flaws requiring repair, so you must disable the security program before running a disk-diagnostic utility.

Deleting and Shredding Files

Hey, Ollie North, listen up. When you throw a file in the Trash, it isn't really deleted—only its directory entry is removed, and anyone with a file-recovery program can restore it in a flash. To prevent this from happening, run the file through a shredder program, available in such utilities as Datawatch Corporation's Citadel with Shredder 1.2 (\$99.95; 919/549-0711), usrEZ Software's ultraSecure 3.0 (\$239; 714/756-5140), and Kent Marsh's CryptoMatic 1.01 (\$99). Some disk-optimizing utilities, including NUM, also provide this feature. Because shredding obliterates the original data by overwriting the deleted file with random data, be absolutely sure you don't want a file before shredding it—there's no Undo in this game.

Locking the Mac

Several programs provide access control for your whole system. Symantec's DiskLock (\$129); usrEZ's ultraSecure and ultraShield (\$149); Casady & Greene's A.M.E. 2.1.9, or Access Managed Environment (\$159 for one user; network versions available; 408/484-9228, 800/359-

4920); and Kent Marsh's NightWatch II 2.5 (\$159.95) all provide a screen-locking feature: when your screen saver kicks in or you trigger it, the regular screen won't come back without a password. Many screen savers, including After Dark, provide screen locking, but real security programs go much further. For example, DiskLock, ultraSecure and ultraShield, A.M.E., and NightWatch II let you disable the Mac's floppy drive or restrict what kinds of files users can copy. You can also specify multiple security levels—for instance, a school computer lab could prevent students from copying applications but allow teachers to do so.

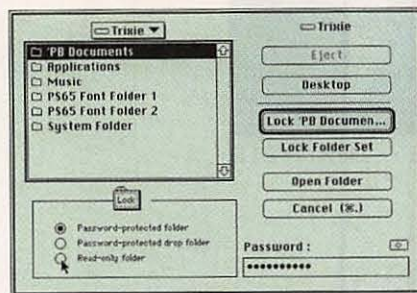
This hierarchical approach extends to other features as well—you can, say, lock applications so that only specified people can run them. To return to the school computer lab example, a teacher might lock a grading program but leave a word processor available to all.

To prevent someone from breaking into a Mac with the brute-force method—a program that enters word after word in the hopes of stumbling onto your password—A.M.E. and ultraSecure also provide an option requiring users to insert a special floppy disk, like a key, instead of entering a password.

Scrambling Files with Encryption

Screen, folder, and disk locks can be broken. If you're serious about security, encrypt sensitive files so that even if someone can access your files, they will be unreadable.

Most security programs provide a relatively fast, light-duty encryption option



Under Lock and Key Kent Marsh's FolderBolt runs as a control panel and lets you password-protect a folder so no one can access its contents, so others can read but not copy or alter its contents, or so others can drop files in but not open it.

as well as a slow, heavy-duty one. The heavy-duty option is usually the National Institute of Standards and Technology's Data Encryption Standard (DES), developed in part at the National Security Agency. DES encryption can be slow—it might take an hour to encrypt a 1MB file—so a Power Mac could help dramatically here. usrEZ says its DES encryption runs five times faster on a Power Mac than on a Quadra 950; so far, only its ultraSecure and ultraShield products are available in native Power Mac versions.

Other programs that should be Power Mac-native by the time you read this include FolderBolt and NUM. A.M.E. is incompatible with Power Macs. The other security programs I've mentioned run only under 680X0 emulation.

Protection for the Road

The nomadic lifestyle of many PowerBook owners incurs unique security risks. All of the programs discussed here are compatible with PowerBooks, but if you don't need disk locking, consider a PowerBook utility package such as VST Power Systems' PBTools (\$99.95; 508/287-4600) or Connectix PowerBook Utilities (\$99; 415/571-5100, 800/950-5880), both of which include rudimentary security features. For example, both can intercept a sleeping PowerBook's wake-up routine and display a dialog box requiring a password. The PBTools manual also contains a great section with tips on security strategies.

Here's one more PowerBook security tip, gleaned from personal experience: Don't store telephone credit-card numbers and passwords on your PowerBook, or you may find yourself spending half a business trip canceling phone cards and changing passwords.

Protecting Your Hardware

Many thieves are more interested in your Mac itself than the data it contains. For

HOW TO PICK A PASSWORD

Using a password that's obvious or easy to stumble onto is the security equivalent of installing steel doors on your house and leaving the key under the mat. Choose your passwords carefully.

- **Don't make it obvious.** Don't use your spouse's first name, your license-plate number, or your telephone number. Pick a pair of words at random from a dictionary. Or use the first letter of each word in an easily remembered phrase; for instance, *she'll have fun, fun, fun, till her daddy takes her T-bird away* yields the password *shffftthdthta*. No one is going to guess that one.
- **Don't make it short.** The shorter the password, the easier it is to crack using brute-force methods. Some programs allow for long passwords (up to 255 characters with FolderBolt). Also, consider using option-key characters in place of some letters, as in *pork@hop*.
- **Do change it often.** Every month or every week is ideal. Most security programs let you specify how often you want to change the password, and then force you to do so when that interval passes. This is especially important if you hire temporary employees who need password access to your data.
- **Don't write it down.** If your password is so arcane that it's as hard for you to remember as it is for someone else to guess, you'll be tempted to write it down. Don't. If you won't remember it, pick a different password.

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Circle 172 on reader service card

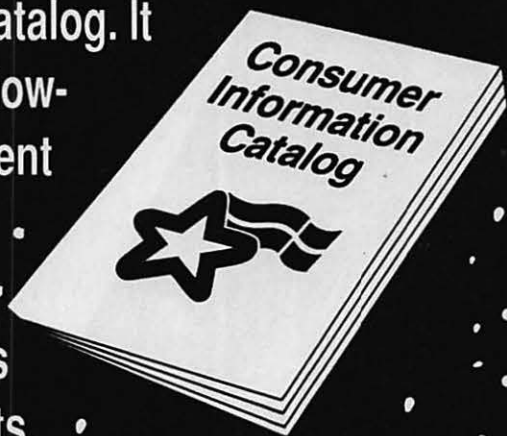


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AT WORK: WORKING SMART

that kind of theft, there are hardware devices that let you lock the Mac down to something solid.

A few years ago, Kensington Micro-ware worked with several hardware makers to devise the MicroSaver (\$59.95; 415/572-2700, 800/535-4242). Some manufacturers, including Apple, build a simple slot into their products to accommodate Kensington's thick, 6-foot galvanized steel cable with a loop at one end and a cylinder lock at the other. Apple has put MicroSaver slots on the Centris/Quadra 610 and 660AV, the Quadra 800 and 840AV, and the Power Macs; on the PowerBook 160, 165c, 180, 180c, and 500-series models; and on the Duo Dock, the Duo MiniDock, and the Duo floppy adapter. Yes, a thief could wrench the lock out of the Mac (breaking its case and making it harder to sell) or cut the cable, but the MicroSaver will definitely discourage them.

For PowerBook 100-series models (but not the 100 itself), an alternative is APS Technologies' PowerBook Security Handle (\$89; 816/483-6100, 800/846-9948). It attaches to the bottom of the PowerBook and includes a cable that you can bolt down. It also gives the PowerBook a carrying handle. Another such device is the Kablit from Secure-It (\$34.95 or \$49.95; 413/525-7039, 800/451-7592), a lock-and-cable system that installs in the PowerBook's floppy drive (also blocking access to the drive).

Security's Drawbacks

Security programs impinge on your normal work routine and the way some programs alter a hard drive can cause problems with file-recovery utilities.

Another drawback surfaces at backup time. You must unlock protected files, folders, and disks before a backup program can copy them. Backing up is enough of a chore in itself; if you also face a multistep process to disable and reenact security software, the tendency not to back up becomes stronger.

Then there's the human factor: writing down a password or E-mailing it to a colleague often compromises security. And a security program could be used against you—just imagine a disgruntled employee encrypting all your file servers.

The best security advice is a variation of "don't leave your valuables in the car." Use removable media, and lock up the media or take it with you when you aren't using it. **m**

Contributing editor JIM HEID is the author and producer of *Macworld Complete Mac Handbook Plus Interactive CD*, the third edition of which was just published by IDG Books Worldwide.

HOW
THE
BEST
GET
BETTER
IN
COLOR
PUBLISHING

Wired Slashes Lead Time

Wired magazine is one hot property. It has quickly grown to a circulation of 150,000 copies and earned a reputation for thought-provoking technology articles delivered in a cutting-edge design. Its often mind-bending look and feel is developed on Apple® Macintosh® systems incorporating Radius display calibration and video-capture technology.

The desktop system at Wired puts its users in control, says Production Art Director Eugene Mosier. "We rely less on traditional systems and out-sourcing. We can therefore almost eliminate the need for outside vendors."

Radius displays are integrated with Radius PhotoBooster™ accelerator cards and PrecisionColor Calibrators, backed by a Worry-Free Warranty, to keep Wired wired.

A well-known problem in magazine publishing is long lead times. But *Wired* magazine, fueled by hardware and software technology from Radius and Aldus, runs on deadlines resembling those of a daily newspaper.

Desktop color technology

provides on-site, real-time experimentation. Radius

PrecisionColor™ Calibrators provide consistent and accurate on-screen color management, as the *Wired* staff develops layouts.

Aldus® Fetch® is the key to collective creativity at *Wired*. Its powerful cataloging capability puts multiple sources at staff members' fingertips: digitized photographs, Apple QuickTime® video, even images

located in *Wired*'s sister office in Japan. Aldus Fetch serves as a visual cataloging tool, empowering Production Art Director Eugene Mosier and the *Wired* staff to choose, use, and reuse images in each issue quickly and effectively.

Major productivity leaps have resulted at *Wired*. Mosier says that the design, type specification, pasteup, prepress, and other functions that normally require nine or ten people are now handled by three or four. To cap it off, the Radius Worry-Free Warranty™ keeps *Wired* wired in a business where system up-time is mission-critical.

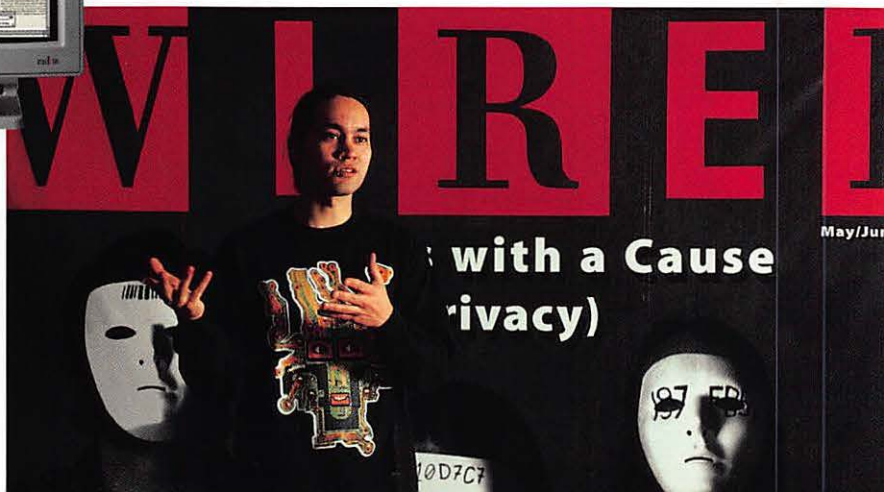
All this translates to astonishing cuts in lead time. For a recent issue, the design and editorial teams were still tweaking the cover story a day and a half before deadline. With conventional systems, such down-to-the-wire performance would have been unthinkable.



By greatly improving the screen accuracy of Pantone® and process colors, the Radius PrecisionColor Calibrator ensures consistent and accurate on-screen color management for color publishing professionals.



Ten years after the introduction of the Macintosh computer, Apple, Radius, and their technology partners continue to



High volume is a constant companion to the color separation business, according to American Color's Greg Hoaglin. The company is one of an increasing number of traditional color preparation houses integrating digital color publishing technology into its business.

With more than 750 employees, American Color relies heavily on the latest technologies. Enhancing the company's fleet of high-end Macintosh computers are Radius 24-bit graphics accelerator cards, Aldus software, and Agfa scanners. American Color clients such as Walgreen Co., Service Merchandise, and the Revco drugstore chain demand large volumes of high-quality, high-resolution color print materials. And they want their materials quickly.



push the envelope in providing powerful, affordable, easy-to-use, desktop-based color publishing and video tools and solutions.

So in Hoaglin's world, high-volume page scanning is a key concern. Systems such as the Agfa® Horizon Plus® scanner enhance productivity by enabling Hoaglin to scan everything from 35mm positive or negative filmstrips to slides to large photos. The Agfa Horizon Plus maintains traditional color quality, yet places material in a digital format for added benefits in image manipulation and processing. For example, the system's variable unsharp masking (USM) capability adjusts scanning resolution, contrast levels, and image density in cases where sharpness is lacking in the original material.

Radius StageTwo Rockets perform dual processing on a single Macintosh computer. Incorporating Aldus® TrapWise™ and Aldus® PressWise™ has allowed American Color to reduce the number of manual stripping tables from sixteen to four.

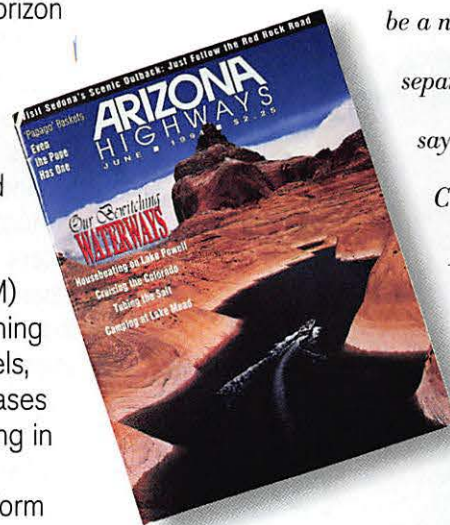
"Because we need to provide a variety of services to our customers, we ourselves need to be well versed in the latest technology," Hoaglin explains. "Using the latest Macintosh computers and top-notch products from companies like Radius, Aldus, Agfa, and others allows us to be so. As a result, we're 99 percent digital today."



Agfa offers a full line of flatbed scanners, from the affordable StudioScan™ for the small business market to the Horizon Plus (shown here) for the professional graphic arts market. Other Agfa scanners include the Arcus™ Plus for desktop publishing applications and the Vision 35®, a 35mm scanner for graphic arts applications.

American Color Scans the Scene

There will always be a need for color separation houses, says American Color's Greg Hoaglin. And American Color is the third-largest



color separation provider

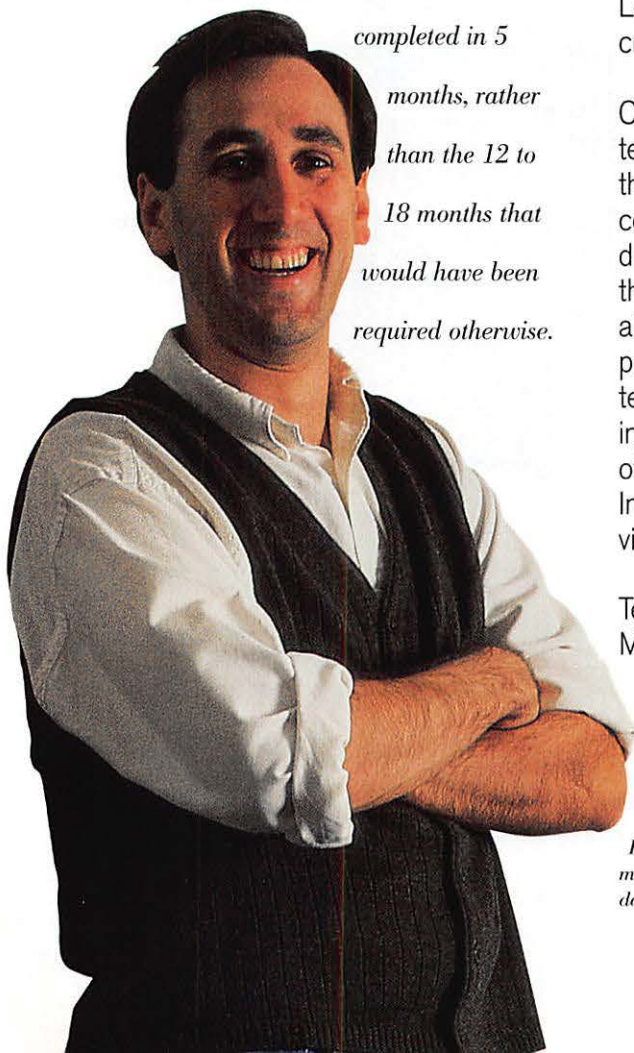
in North America. But his company saw the need several years ago to change part of its mission from that of service provider to that of publishing technology advisor and provider.

CKS Partners Takes Off

CKS Partners is a full-service, one-stop communications company that depends on Macintosh computers and other desktop color publishing technology to provide integrated marketing solutions for its clients.

"We have at least one of every desktop color peripheral and application," says Mark Loncar, CKS Vice President and Director of Information Technology. That technology allowed a redesign for United Airlines to be

completed in 5 months, rather than the 12 to 18 months that would have been required otherwise.



When companies such as United Airlines need to redesign their corporate look, they turn to CKS Partners for fast, creative response to their needs. CKS integrates Radius LeMansGT™ graphics accelerator cards, Radius

PrecisionColor Calibrators, and a Seiko Instruments Professional ColorPoint 2™ printer into its network of Apple Macintosh Quadra®, Power Macintosh™, and PowerBook® systems. This allows CKS to generate concepts quickly, with accurate color.

Clients can view designs on a Radius display or printed out from color printers such as the Seiko Instruments Professional ColorPoint 2. The printer's dual print capabilities allow efficient use of the latest technologies. For example, CKS counts on the Seiko

Instruments printer to produce economical drafts in thermal transfer mode, then print final designs using top-quality dye sublimation technology. And the printer's Adobe™ PostScript™ Level 2 software guarantees cross-application compatibility.

For United Airlines, CKS's skillful use of technology came through with flying colors. CKS developed more than 300 design alternatives for this project using color printing technology. Another presentation involved a full-size representation of an aircraft tail section which came straight off the Macintosh. In the field, painters use portable Apple PowerBook systems to visualize their work and provide feedback to CKS.

Mark Loncar, CKS Vice President and Director of Information Technology, looks forward to even greater gains as Power Macintosh systems are fully integrated. "We're very supportive of the PowerPC™ platform and plan to move to it," he says. "The Macintosh platform is simply the best for what we do."

The Apple PowerBook was instrumental in executing the new look developed by CKS Partners for United Airlines. Apple Power Macintosh systems bring new levels of price/performance to the market while maintaining the industry-standard Macintosh interface and top-notch applications support.



Today's powerful Macintosh-based solutions provide tremendous performance and value, and continue to let



The Seiko Instruments Professional ColorPoint 2 PSF features dual printing technologies, both dye sublimation and thermal wax transfer, all in one printer. It comes complete with embedded Adobe PostScript Level 2, and prints up to 16.7 million colors in both modes.



Students in the Graphic Communication department at the California Polytechnic State University, San Luis Obispo (Cal Poly) are learning how to be color publishing professionals. Using products such as Aldus® PageMaker®, Aldus FreeHand®, Aldus Fetch®, Aldus TrapWise®, and Aldus PressWise®, they capture and develop specific pieces of art, render individual pages, and create complete publication layouts.

The Aldus products offer a complete solution from design to layout to prepress. Not only is it easier to teach with a powerful array of professional tools, but also students can receive in-depth training on specific tasks. They can become experts in any specific application, each of which by itself is important in the professional publishing world.

Aldus TrapWise is used to instruct students in the use of professional electronic trapping, to create pages and spreads that meet or surpass traditional, nondigital stripping standards. Aldus PressWise is used in the development of advanced electronic page imposition, and to train students how to create precise, "plate-ready" signatures of multipage documents for use on commercial presses.

The real world is also present in the budgetary sphere, according

to Professor Michael Blum, who runs the electronic prepress lab. For example, the lab cannot afford all the workstations it needs for all the jobs that need to be done. So Blum installed Radius StageTwo Rockets to boost the power of the lab's Macintosh computers. "The StageTwo Rockets handle functions in the background without taking a performance hit," he notes. Students can now render images in the background while laying out pages on the screen, in essence doubling their efficiency.

Overall, the plug-and-play world of the Macintosh and Radius graphics cards facilitates teaching and learning, according to Blum. "The technology in our lab is a pleasure to work with," he says. "We just plug everything in and teach classes."

creative people solve problems that couldn't be solved before. They put creative control back in the hands of creative people.

An array of Aldus products helps creative professionals design and produce sophisticated printed materials. Aldus PageMaker, Aldus Fetch, Aldus TrapWise, Aldus PressWise, and Aldus FreeHand set up a fast, easy-to-use framework for design and layout, image capture, manipulation, cataloging, retrieval, and print production.

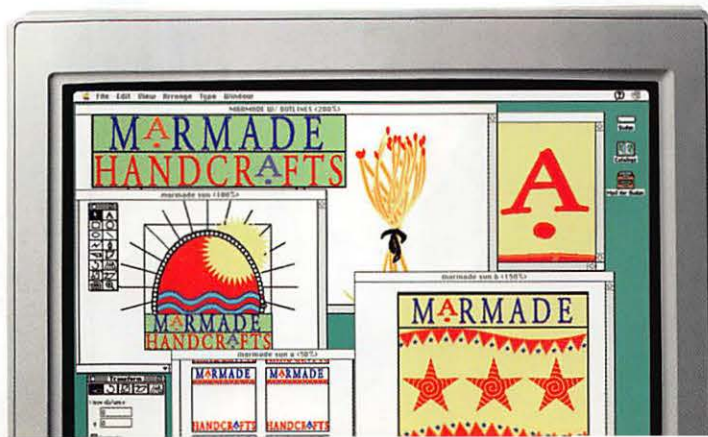


Cal Poly Turns Students Into Young Pros

For Harvey Levenson and Michael Blum at Cal Poly, color desktop publishing technology is crucial to their mission of preparing students to manage technology

in the graphic communication industry.

"Change used to be the exception in this industry; now it's the rule," says Professor Levenson. "We are preparing students so they can help lead this change."

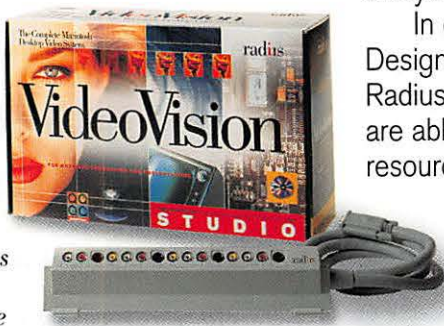


Cronan Catches Creativity and Bottles It

Cronan Design is an award-winning San Francisco-based design firm, with a diverse client list that includes Levi Strauss, Simpson Paper, HarperCollins, and the San

Francisco Museum of Modern Art.

"Desktop technology gives us a much more compact way of organizing our production processes," says Cronan designer Lisa Van Zandt. "Everything is digitized on the computer, so we have faster access, and there are no superfluous things floating around the office. And, it's easy for us to hold onto files as long as necessary and go back into them quickly when a client needs to make a change."



"Through the use of Radius technology, we truly bring the worlds of print and video together," says Michael Cronan of San Francisco-based Cronan Design.

The company incorporates Macintosh-based systems outfitted with Radius graphics accelerators and Radius VideoVision™ Studio to digitize everything in all of its projects from start to finish.

In designing annual reports for major companies, Cronan Design captures graphics and video from multiple sources. "Using Radius VideoVision Studio to capture existing video material, we are able to work with corporate resources that we simply couldn't touch before," says

Cronan. "It's now easy for us to take extremely precise screen grabs of video and use that digitized material exactly as we and our clients envision it."

In its corporate identity and packaging design projects, Cronan Design works on everything from formal presentations to consumer items such as bottle labels. Digitizing these jobs from start to finish also means no large paper files, notes designer Lisa Van Zandt. The system saves time in other ways: for example, creating comps and presentations is much faster and easier. Cronan designers can make client change requests on the fly, down to the pixel level, and immediately demonstrate the results.

The firm saves its clients time and money by enabling them to exercise on-the-spot control over the decisions that affect their projects. Those time savings in turn translate into greater creative freedom. Designer Van Zandt benefits from the considerable contribution by Radius graphics accelerators. Notes Van Zandt, "By using Radius graphics accelerators, we get the top-quality graphics we want, running at the high speed we need."

The team at Cronan Design is delighted with its ability to maintain creative control while minimizing mechanical tasks in implementing its designs.

Photo by: Penina Meisels



When the *San Francisco Examiner* decided to add color, it found that traditional methods consume vast amounts of time, money, and resources. What may seem an obvious point is not so easily solved in an operation the size and scope of a major newspaper. But Chris Gulker was determined. "Very few push the envelope as far as we have," Gulker says.

The Macintosh-based color publishing system empowers the *Examiner's* editorial personnel to handle color production work themselves. Tools such as Radius graphics accelerators, Seiko Instruments printers, and MicroNet storage systems have turned the system into an in-house digital color shop. Stories are written, laid out, proofed, and stored in this new, all-digital world.

The Radius StageTwo Rockets keep the Macintosh computers running full tilt toward deadlines, while VideoVision Studio cards capture and reproduce video or television images from all over the world. Printers such as the Seiko Instruments Professional ColorPoint 2 color printer provide full-color, accurate previews of pages and layouts.



Pushing the envelope also meant developing a "digital darkroom," in which wire-service photos are archived and continually updated onto highly reliable MicroNet disk arrays. Thus, *Examiner* editors store and quickly retrieve hundreds of full-color photos on file two to four times faster than with other computerized systems. Large image files can be retrieved quickly, relieving network bottlenecks and increasing productivity. This is a major advantage over the slow, tedious process involved in retrieving items from the enormous "morgues" common to newspapers.

In short, Gulker says, "Without a Macintosh-based platform and the publishing technology from Radius, MicroNet, Seiko Instruments, and others, we wouldn't have a color paper."

Chris Gulker is the leader of radical change at the century-old San Francisco Examiner. Implementing Macintosh-based technology throughout the organization drove the changeover to a color newspaper and the creation of a new Sunday magazine.



S.F. Examiner "Pushes the Envelope"



The old San Francisco

Examiner Magazine

was a victim of the high cost of traditional color publishing methods. But the new,

full-color Sunday magazine

is produced entirely on Macintosh

computers, incorporating Radius technology.

By taking the color publishing processes digital, time- and labor-intensive stripping costs were eliminated. Produced in a "virtual newsroom," the 64-page San Francisco Examiner Magazine links the service bureau, printer, remote editors, and others. "The system allows us to operate with a thinner staff and reduces the amount of handling," says Director of Development Chris Gulker.

Three high-end storage solutions from MicroNet include the Raven Disk Arrays (with capacities from 1 to 17.3 gigabytes), the TMO-1300 optical drive (with 1.3 gigabytes), and DAT backup drives (with capacities from 2 to 8 gigabytes.)



Want to know more?

We've presented an overview of only a handful of color publishing companies. Each relies on publishing tools and solutions that facilitate creativity, top-quality production, flexibility, productivity, and quick turnaround. They're also concerned about managing their budgets. Companies such as Radius, Apple, Seiko Instruments, Aldus, Agfa, and MicroNet together provide color publishing tools



and solutions that enhance creativity in the real world of budgets and deadlines.

If you'd like to learn more about how you can benefit from digital color publishing solutions, please call Radius at 1-800-227-2795. (If you are calling from outside the U.S. please call 408-434-1010.) To have information sent directly to your fax machine, please call 1-800-966-7360.

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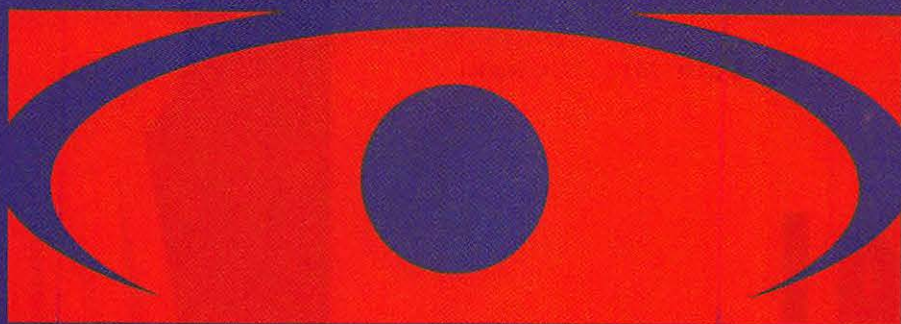
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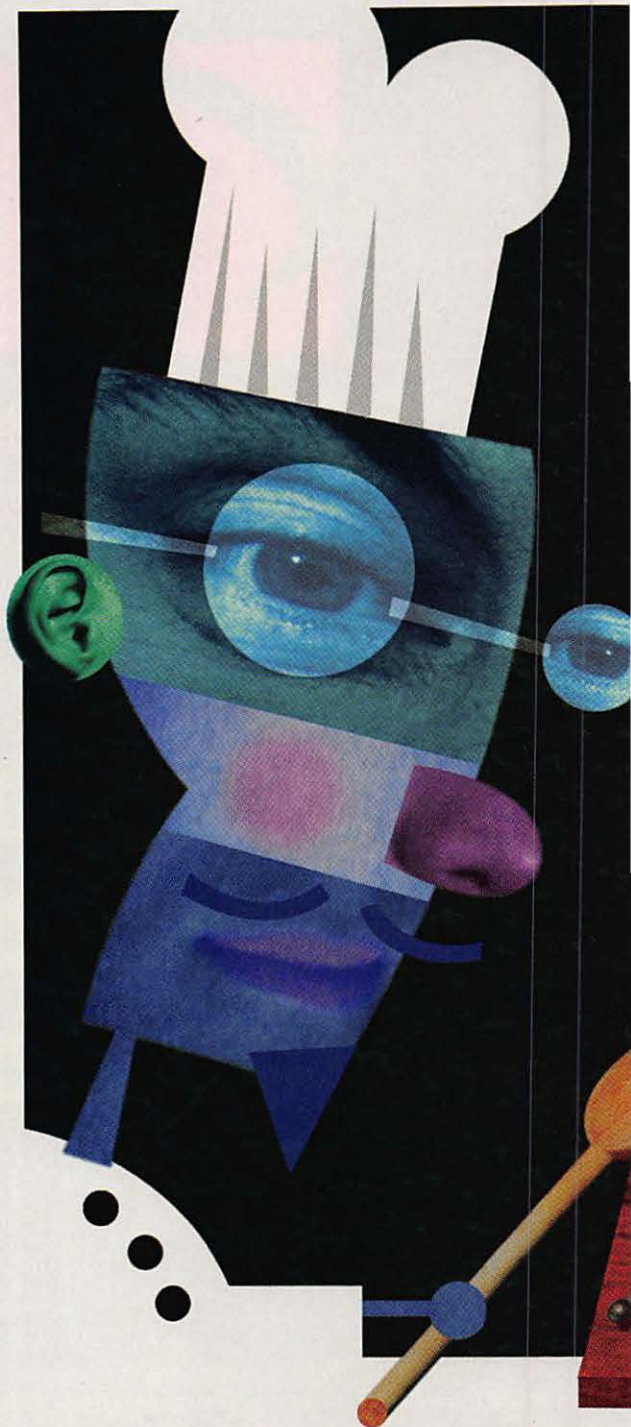
The complete picture.

by Stan Miastkowski

Excel



A
quick-start
guide
to using
Excel's
powerful
new
features



FOR CREATING A START-UP'S business plan or managing a corporation's multimegabuck budget, a spreadsheet is the indispensable financial workhorse—and we Macintosh users live in a one-horse town called Microsoft Excel. While Excel can do wondrous things with your numbers, using it requires a great deal of time: time to enter all your data, and time to ferret out Excel's many power features and learn its shortcuts. Excel 5.0, the program's latest incarnation, goes a long way toward making routine tasks painless and making arcane features accessible.

Whether you're an experienced numbers-navigator or just getting started with spreadsheets, this



article will help you get the most from Excel 5.0. Note that this article is not a critique: it is based on a prerelease version of the program, and *Macworld* does not evaluate prerelease products. For a critical evaluation of the new Excel, watch our *Reviews* section. (Excel 5.0, Microsoft Corporation, 206/882-8080, 800/426-9400. Microsoft no longer issues list prices, but the street price should be about \$325.)

Data Entry

Before you can put Excel to work calculating and analyzing your numbers, you have to enter the raw data into a worksheet. Version 5.0 adds some special

features to simplify that task and alleviate some of its monotony and drudgery.

World Series Entering a series of values such as months, serial numbers, and so on is time-consuming, boring—and inescapable. In Excel 4.0, the AutoFill feature partly automated the process, and in Excel 5.0 AutoFill has been extended to give you a consistent and easy way to enter not only standard series (such as Monday, Tuesday, Wednesday, Thursday, Friday) but also custom series that you create.

Excel can recognize and complete many common series. For example, to enter the months of a year, type *January* in the first cell. Then grab the cross-shaped

fill handle on the cell and drag it down or across 11 more cells; Excel fills in the remaining months.

For numbers or a nonstandard series, enter the first value, hold down the control key, and drag the fill handle over the cells you want to fill. When you release the control key and the mouse button, an AutoFill shortcut menu pops up with fill options. If, for example, you've entered a date, you choose days, weekdays, months, or years to fill the cells.

Excel 5.0's AutoFill also supports custom reusable lists, which you can create by selecting a list

that you've already entered on a worksheet or by keying one into the AutoFill dialog box. For either, choose Options from the Tools menu and use the Custom Lists tab. (A tab is an interface feature new to Excel 5.0 and Word 6.0. It looks like the tab on a file folder, and you use it to thumb through layers of features inside dialog boxes.) The New List option lets you add your own list. For example, if you often enter a list of your company's local offices, say Bangor, Secaucus, Columbus, Las Vegas, and Twenty-nine Palms, just enter the values. Next time you need that list, just enter the first value (Bangor), grab the fill handle, and drag it. Excel automatically fills in the other locations.

Finding the Function As with lists and series, you could build complex functions, such as BINOMDIST and CUMIPMT, every time you needed them by combining long strings of Excel's basic operators. But why do that when you have one-click access to prebuilt functions, a key benefit of spreadsheets over pencil and paper? Excel 5.0 has more than 220 built-in functions, and when you need to find exactly the right one for a new or unusual situation, the Function Wizard helps you pick an appropriate function, assemble its arguments, and insert it in your formula.

Here's an example. You've set up your growing company's finances in a worksheet and need to know how purchasing a small office building will affect your monthly bottom line. The place your real estate agent showed you costs a mere \$180,000, and you can afford to put \$50,000 down. Today's 30-year mortgage rates are a flat 8 percent. What's the monthly payment?

First, make sure the cursor is in the cell where you want the monthly payment to show up. To use the Function Wizard, click on its button on the standard tool bar or choose Function from the Insert menu. The first screen groups functions into logical categories, including your ten most recently used choices (see "Finding Your Function"). Obviously, you're looking for a financial function, so click on that category. As you scroll down the list of functions, you'll see a short description of each with its arguments. PMT (payment) looks like the right choice, so select it and click on the Next button. (If you know which function you need but don't remember its arguments, type control-A to go directly to the argument dialog box.)

To set up your formula (see "Function Arguments"), enter the interest rate (8%/12 calculates the monthly rate), the period (C8 points to a cell in an existing worksheet), and the present value (-\$130,000—that's the price minus the down payment). The monthly payment appears immediately in the Value box in the upper right corner. You can play with different rates, periods, and payments before clicking on the Finish button to place the monthly payment in your worksheet. For complex formulas, buttons to the left of each argument let you include additional functions in your arguments.

Data from Databases Do you need access to an external source of data, either a database on your Mac or a centralized corporate database on the network? Getting external data into Excel in a usable form has always been an involved multistep process, but Excel 5.0's new query tool uses Microsoft's data-retrieval

SHOULD YOU UPGRADE FROM EXCEL 4.0?

Every time a new version of a major application ships, you have to ask yourself, Should I upgrade? The answer isn't always simple. It invariably takes time to learn to use the new version, and the software industry has an often-well-deserved reputation for shipping products before they're thoroughly debugged.

Excel 5.0 is a major upgrade, but even the prerelease version we tested for this article was largely bug-free, and the transition to the new version is actually a minor one because virtually everything you do in Excel 4.0 can be done the same way in Excel 5.0, often with fewer keystrokes, and you can use your current worksheets without modification. If anything, Excel 5.0's Wizards make your work easier.

If you're an Excel power user, the question of macro compatibility is important. Microsoft says that all macros written for previous versions of Excel run in Excel 5.0 and that you can still write macros in the version 4.0 macro language; if you record macros instead of coding them, you can choose between the old language and VBA (Visual Basic for Applications), the new programming language that Microsoft is integrating into all of its major applications.

The bottom line is that it would be difficult not to recommend upgrading to Excel 5.0. It will cost you \$129 direct from Microsoft (or \$99 through the end of this year). We have covered a lot of the neatest new and improved features in the main section of the article; here are some additional new and up-

dated features in Excel 5.0.

■ **Tip Wizards** Pop-up productivity suggestions based on observing the way you work. They're smart enough to leave you alone once Excel 5.0 "sees" the way you like to do things.

■ **ToolTips** Context-sensitive help without balloon help. If you don't remember what an icon means, point to it for a couple of seconds and a tip screen pops up.

■ **Workbook Tabs** Navigating multiple-page worksheets is a breeze, like thumbing through a notebook.

■ **In-Cell Editing** You can manipulate data or formulas in the cell. Now there's no need to enter the formula bar.

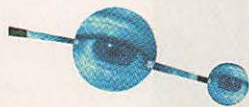
■ **Rich Text in Cells** Support for multiple fonts, formats, and colors in a single cell. Any character can have any formatting.

■ **Format Painter** An icon that lets you drag and drop the format from one cell into any other cell on your worksheet.

■ **Enhanced Auditing** A new tool bar for easy access to visual auditing tools, which show relationships between cells or worksheets. Clicking on the head or tail of graphical arrows lets you navigate among related cells.

■ **Messaging and Routing** Excel 5.0 supports AOCE (Apple Open Collaboration Environment) for direct links to E-mail, and it has a routing-slip option that tracks a worksheet's path through a workbook.

■ **Menu Editor** This lets you customize the Excel menu structure—particularly useful if you're creating custom worksheets or applications for your colleagues.



standard, ODBC (Open Database Connectivity), to simplify that task.

To use the query tool, you also need DAL 1.5 (Data Access Language—a layer of database communication software that was until recently an Apple product and is now available from Independence Technologies, 510/249-0970; price depends on database and platform). Excel 5.0 comes with ODBC drivers for grabbing data from FoxPro and SQL Server, and if you need access to Btrieve, Oracle, text, and Excel versions 3.0 and 4.0, you can purchase Microsoft's Excel ODBC Kit (\$5.25 plus tax and shipping, Microsoft Press, 615/793-5090, 800/677-7377). DAL 1.5 comes with ODBC drivers for 15 of the most popular database managers, and third-party ODBC drivers are also available.

Once you've got all the parts installed, let's say you need to incorporate weekly sales data from your corporate database (FoxPro on a NetWare server) into your projections worksheet. To set up the query, choose Get External Data from the Data menu or click on the Get External Data button. The query tool leads you through selecting the FoxPro data you want, imports the data, and places it in your worksheet. If you always want the most current data in your worksheet, you can keep the query in the worksheet, and each time you open the worksheet it will connect to FoxPro and download the latest data.

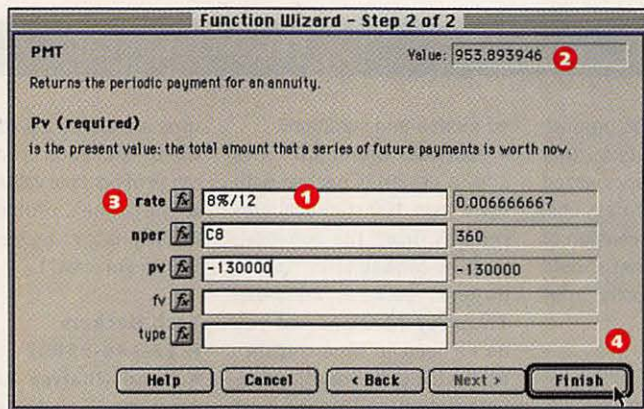
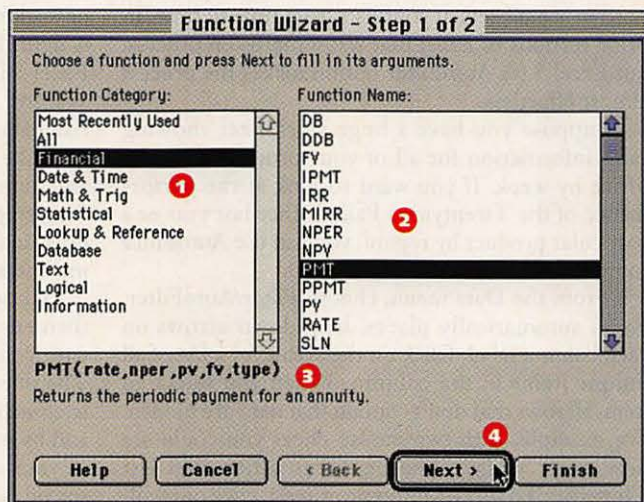
Navigating Your Data

Organizing with Outlines While you may need to include a lot of detail in your worksheet, finding the essential summary information can sometimes be a chore for the harried folks (such as your boss) who look at your work. Excel's outliner lets you set up worksheets so that they display only summary information, while the detail information remains in the worksheet. For example, a sales summary might outline only the yearly totals, but details on monthly sales or sales by product are only a click away.

Excel 5.0's new Automatic Outline command outlines a worksheet on its own, but to use this feature, you must organize your data in predictable rows and columns of detail and summary, with formulas referring to data above or to the left. (That's the way most people set up worksheets—if you crunch numbers to a different drummer, outlining may give you interesting results.) To outline a range, just select it; to outline the entire worksheet, choose any cell. Then from the Data menu, choose Group and Outline/Auto Outline. Excel creates Show Detail and Hide Detail buttons on the edges of the worksheet for collapsing and expanding the outline levels. Note that before you use Auto Outline, you need to turn

Find Functions Fast

Excel 5.0's Function Wizard helps you figure out which of the 220-plus built-in functions are exactly right for your formula.



Finding Your Function

The Function Category scrolling list displays functions in logical groups (1). When you highlight a function (2) a summary of the function and its arguments appears (3). After you've picked your function, click on the Next button (4) to go to the next step.

Function Arguments

Enter the data for the arguments (1) directly or as cell references. The calculated value appears immediately (2). To include functions within arguments, click on the buttons next to each argument (3). Click on Finish (4) to place the value in your worksheet.

on the Automatic Styles option. You'll find it under Date/Group and Outline/Settings.

The Name Game The larger and more complex your worksheets, the more difficult it can be to navigate the hills and valleys of data. Want to find first-quarter sales for the regional offices? You know the information is there somewhere because you entered it yourself—six months ago. If you don't remember which cells it's in, you can wander around the worksheet looking for it; next time, you'll remember to give it a plain-English name. (You can also name individual cells and formulas.) Previous versions of Excel had naming, but version 5.0 provides a pull-down Name Box that makes creating and using names a breeze (see "List of Names").

First, find the cell or cell range you want to name and select it. Then either choose Name/Define from the Insert menu or click on the Name Box at the left end of the formula bar that contains the reference to what you've selected. All you need to do is type in the name you want to use (for example, Q1_Columnbus; no spaces allowed). Do this with important cells, ranges, and formulas, and soon you'll have them all in a handy list. You can select any name from the list to jump to its location or use it to enter a reference to the cell or range in a formula or array.



Data Analysis

Filtering Your Data According to Microsoft, 70 percent of Excel users manage lists of data with worksheets. If that 70 percent includes you, you probably need to see subsets of your lists from time to time. In prior versions of Excel that was a multistep process, but Excel 5.0's AutoFilter option makes the process almost effortless.

Suppose you have a huge worksheet showing sales information for all of your products by sales office by week. If you want to look at the performance of the Twentynine Palms office last year or a particular product by region, you can use AutoFilter to extract the information you need.

From the Data menu, choose Filter/AutoFilter. Excel automatically places drop-down arrows on each column label. Click on the arrow for a list of all unique items in the column. When you select an item, all rows that don't contain that item are hidden. For example, with two mouse-clicks you could see how many widgets the Secaucus office sold last Thursday. To sort on multiple criteria, click on a col-

umn arrow and choose Custom. Up pops a dialog box that lets you designate more columns or rows as filters, and apply AND and OR operators.

Slicing and Dicing One of the biggest challenges of working with all the raw data in a typical worksheet is figuring out how to analyze it. New and unique in Excel 5.0 is an easy way to do that: the PivotTable Wizard. A PivotTable lets you divide and summarize data in almost limitless ways. For example, you can take a year's worth of weekly sales worksheets and summarize them by region by product. The four-step PivotTable Wizard provides a graphical drag-and-drop process to walk you through organizing and aggregating your data.

Choose PivotTable from the Data menu, and then enter the range or range name containing the data you want to use, or select it with the mouse. The third and crucial step in the PivotTable Wizard is choosing what data to summarize or break out, and by which categories. Buttons bearing the names of your data fields appear on the right side of the screen (see "Prepare to Pivot"). Drag and drop them



ENHANCING EXCEL

Several companies produce extensions for Excel that provide tools for specialized users or specific professions. The following is a selection of some extensions that should ship when or shortly after Excel 5.0 ships.

Spreadware

(619/347-2365)

■ **Business Financial Analysis 2.0** BFA (\$49) helps you analyze your company's current financial position. Its core is cash-flow analysis and it supports up to 100 revenue sources. A key part of BFA is its incorporation of the Z Score model, which predicts the likelihood of your business going bankrupt. That's a good thing to know.

■ **pro forma 2.5** If you are looking for new investors, keeping your existing investors informed, or just looking at where your company is going, pro forma (\$189) helps you forecast and evaluate your company's financial position, estimate required financing, and closely track cash flow. The program automatically creates pro forma (projected) financial statements, letting you create virtually unlimited

models and variations.

■ **Statistics Menu 3.0** This add-in (\$129) is packed with more than 100 statistical procedures, from the common, such as probabilities, to the esoteric, such as Friedman Two-Way ANOVA. And you don't need to be a statistics hacker to use it: extensive documentation and online help lets anyone get involved in deep statistical analysis.

Decisioneering

(303/292-2291)

■ **Crystal Ball 3.0** Crystal Ball (\$295) is a unique forecasting and risk-analysis program with a twist. It goes beyond Excel 5.0's built-in forecasting abilities by letting you explore not only what is possible (the classic "what-if"), but also what is probable. Worksheets that forecast the future contain uncertain data by necessity—what are essentially your best guesses. Crystal Ball helps make forecasts more reliable by letting you describe a range of possible values for each uncertain cell. It then

uses a process called Monte Carlo Simulation to predict a range of possible values as well as each one's probability of actually happening (see "Crystal Ball Forecast").

Tech Hackers

(212/344-9500)

■ **bond @analyst 2.0** The name says it all: this program has virtually everything you need for working with treasury, agency, corporate, and municipal bonds. \$495.

■ **financial @analyst 2.0** financial @analyst (\$195) adds 45 financial functions to Excel 5.0 for heavy-duty financial analysis. It helps you analyze rates of return, cash flow, and margins, as well as sophisticated

amortization and annuities. Several functions also help with the thorny problems of data arithmetic.

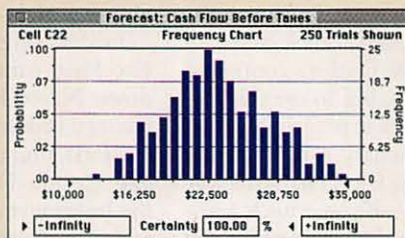
■ **mbs @analyst 2.0** MBS (\$495) stands for mortgage-backed pass-through securities. If you know what those are, you need this package.

■ **options @analyst 2.0** Another add-on for investment analysis, this package (\$495) helps you track the vagaries of options investing.

Epic Systems

(818/355-2988)

■ **Neuralyst 1.3** Neuralyst (\$195) adds neural-network capabilities to Excel 5.0. Neuralyst works on your existing data, and you don't need to be a scientist to use it. It automatically goes to work to analyze and learn the relationships among your data. Once that process is complete, Neuralyst then integrates new data as you enter it and makes evaluations and predictions. Depending on your Mac, initial analysis can take quite a while, but the results are worth it.



Crystal Ball Forecast This example of a Crystal Ball forecast shows the assumptions made—for example, that available cash will be somewhere between \$10,000 and \$35,000—and how likely the amount is to fall at any point in that range.

into the row, column, and data areas of the screen, then go to the final screen to set totaling and layout options, and press the Finish button.

Your finished PivotTable appears, along with a floating tool bar that allows you to easily explore alternatives or hide and show levels of detail (see "A Pivoted Table"). One of the PivotTable's handiest features is DrillDown, which lets you click on a summary value to reveal the individual records or cells that make up that summary.

Scenes from a Spreadsheet

Computerized spreadsheets have come a long way since the dim and distant days of VisiCalc, but no matter how many bells and whistles they take on, one of the basic goals of a spreadsheet is "what-if" analysis: What happens to the bottom line if sales are up X percent? If Product Y ships three months late? If your company wins its suit against Supplier Z? A common way to compare projections is to create multiple scenarios, such as best case, worst case, and most likely.

Excel's Scenario Manager lets you create and save multiple scenarios. Let's say one of your product lines is hot but you expect a serious competitor to enter the market this quarter. The worksheet you've created shows your best guess for this quarter's sales, but you need to know what will happen if the competition's product succeeds or bombs.

Choose the cell that contains the estimated sales figure, then pick Scenarios from the Tool menu. Click on the Add button in the first screen and give the scenario a name that makes sense, such as Product Y Best Case. In the next screen, enter a best-case value and click on OK. Scenario Manager takes you back to enter another scenario, such as Product Y Worst Case. (You can add as many scenarios as you need.) Then click on the Merge button on the Scenario Manager screen. You'll see another screen that gives you the option of creating a basic summary or a PivotTable from the summary.

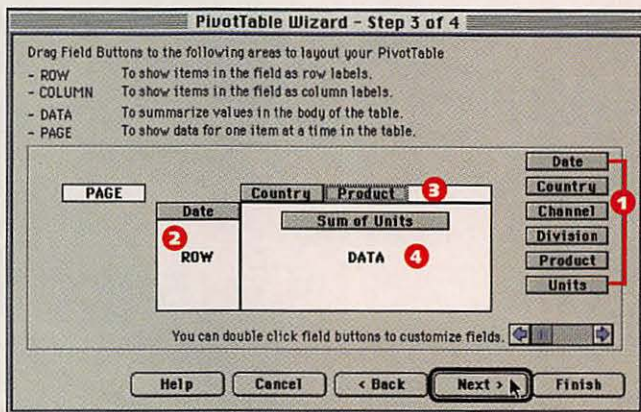
Excel 5.0's Scenario Manager automatically tracks changes and records who on the network has modified the scenarios and when, which makes it particularly useful for batting around guesstimates with your colleagues.

Beyond Worksheets

Spreadsheet Solutions To make using and interpreting a worksheet easier for you, Microsoft Excel 5.0 includes tools for turning your garden-variety worksheets into interactive applications with graphics and notes, as well as controls and commands such as dialog boxes, radio buttons, check boxes, and scroll bars—not to mention the ubiquitous OK and Cancel buttons.

Slicing and Dicing

Excel 5.0's new PivotTables let you view and cross-tabulate multidimensional data by simply dragging data headings into place. The PivotTable Wizard leads you step-by-step through the process of setting up a PivotTable.



Prepare to Pivot

The PivotTable Wizard displays the field names from your data (1). To set up your PivotTable, drag and drop the field-name buttons onto the row (2), column (3), and data (4) areas.

Date	Country	Product	Sum of Units
1/1/93	Australia	Flute	0
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1/1/93	Australia	Trumpet	0
1/1/93	Australia	Violin	0
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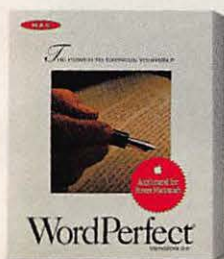
*Suggested retail price. Reseller prices may vary. You must own a competing word processor with a suggested retail price of \$249 or more.
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Click the button. It's
so simple. Click. It's
the easiest way to get
things done. Which is

**Our ruler bars give
you a whole new way to
look at formatting.**

why new WordPerfect® 3.0 for the Mac® puts all the things you want from your interface in your face.

Giving you more buttons to click than any other word processor. So features are easy to find. And
use. Want to change your text formatting? Click. Apply a style? Click. Create a table? Click. Then



**Word processing
that gives you
the power to
express yourself.**

you can bring up a different bar with all the table functions you want. Borders,
editing—even math functions—it's all right there. Click. Our customizable
button bars put your favorite tools right there, too. Like spell checking.

Grammar checking. Our integrated drawing program. Whatever
you want. There's even buttons for common tasks like



bulleted indents. So you'll seldom have to do anything. Besides click. (And type, duh. This is a
word processor.) But you can do other cool stuff, too, like run QuickTime™. Or WordPerfect native
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petitive upgrade. If the number was nine buttons
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BY LON POOLE

Quick Tips

Tips, Tricks, and Shortcuts

YOU IMPORT AN EPS FILE INTO MICROSOFT Word, and it looks fine on screen. But when you try to print the document, Word substitutes all the fonts of the imported image with Courier. To fix the problem, you open the imported image in Word 5.1's picture editor. There you add a few characters, each one set to a font that didn't print. After you close the picture editor, you crop the extra characters out of visibility. Even though these extra characters are not visible, they trick Word into downloading the fonts needed to print the imported image correctly. Voilà... or so you thought.

It turns out this trick works only with the LaserWriter 8 driver. The LaserWriter 7 driver substitutes fonts in an imported graphic even if the identical fonts are used elsewhere in the Word document. The correct fonts are used in the text of the Word document, but the same fonts are still replaced with Courier in the imported graphic.

Easy Rebuilding Update

Like Martha Fullmer of Waupaca, Wisconsin, you may get a message saying the name Desktop is already taken when you try to rebuild the desktop of your hard drive by creating a folder named Desktop at the root level of the hard drive (as a tip last May suggested). This means your hard drive contains an invisible file named Desktop, in which the System 6 Finder keeps desktop information (System 7 keeps desktop information for hard drives in two other invisible files, Desktop DB and Desktop DF). The invisible Desktop file exists on every floppy disk and on any hard drive that has ever been used with System 6 and has not been initialized since then. Also, System 7 sometimes appears to create the invisible Desktop file on hard drives, although I haven't been able to prove this.

You can work around the invisible Desktop file by making it visible with a utility program, or by replacing the invisible file with a visible document saved by Microsoft Word or some other commonly used programs. Use the Save As command to save any document with the name Desktop at the root level of the hard drive. Leaving a replacement Desktop file visible in the disk window (or discarding it and creating a folder named Desktop)



causes the Finder to rebuild the hard drive's desktop automatically when you restart the Mac.

RAM Speed and Composite SIMMs

Q An Apple product-information staffer told me the correct SIMM speed for a Centris 650 is 80ns, but several reputable mail-order firms recommend 60ns for the Centris and Quadra while others recommend 70ns. Which is right? Also, can I use composite SIMMs?

*Parker Montgomery
Santa Barbara, California*

A All Macs can use 80ns RAM, even the Power Macs, with the following exceptions: the Centris and Quadra 660AV require 70ns minimum; the Quadra 800 and 840AV require 60ns minimum. Some Macs can use slower RAM: the Classic II, Color Classic, LC, LC II, and IIsi can use 100ns RAM; the Classic, SE/30, IICx, II, and IIX can use 120ns; and the Plus and SE can use 150ns. You can always install faster RAM (for example, 60ns or 70ns instead of 80ns), although it does not make the computer operate faster and it may cost more.

Because they have more RAM chips than conventional SIMMs (for example, 32, 4Mbit chips instead of 8, 16Mbit chips on a 16MB SIMM), composite SIMMs are too big for some Macs. Where they fit, composite SIMMs may work under some conditions, but the extra circuitry required for their low-capacity RAM chips can cause random memory failures by delaying memory access, increasing signal noise, and drawing more electrical current than conventional

SIMMs. Mac models optimized for maximum RAM performance, such as the 660AV, 840AV, and Quadra 800, are particularly sensitive to these random variations. Typical symptoms include unpredictable start-up failures, system errors, and crashes. Composite SIMMs with signal buffering sometimes cause problems mounting floppy disks on 660AVs and 840AVs. Problems may occur with one composite SIMM but not another, and two composite SIMMs may work together but four may not. One computer may

tolerate them while another of the same model does not. Some SIMM makers claim to have solved these problems, but Apple says it has not verified any composite SIMMs and does not recommend using them in any Macintosh.

⌘-Key Symbol

Q Is there a common font that has a key combination that produces the squiggly symbol on the command key?

*John Browner
Durham, North Carolina*

A Select the Chicago font and press control-Q. Pressing control with P, R, S, or T generates other little-known symbols, and the TrueType version of Chicago has a total of 21 symbols you get by pressing control with other keys (see "Chicago Symbols"). However, you probably won't see any of the new special symbols if you set the font size to 12 points or any other size for which a fixed-size (bitmapped) Chicago is installed in your System file. (Chicago 12 and Monaco 9 are in the ROM of all Mac models except those older than a Plus.) Fixed-size versions of Chicago don't include the new symbols, and most applications use fixed-size fonts wherever possible. Some programs ignore keystrokes that involve the control key, but you can always copy from the Key Caps desk accessory, paste to another program, and change the pasted character to Chicago 13 (a size that forces use of TrueType).

Missing AOL Localities

TIP To use America Online 2.1's new Locality feature (very useful for travelers), you must create and save connection settings for each place you go. The on-screen help tells you how to do this but doesn't mention that the connection settings files must be saved in the Online Files folder (which is in the same folder as the AOL application). That's the only place the application looks for Locality files. AOL tries to open the correct folder when you save a Locality file, but a system extension such as Directory Assistance (part of Norton Utilities for Macintosh) may route you to a different folder.



Chicago Symbols This keyboard map shows 21 special symbols present in the TrueType version of the Chicago font. To type one, set the font and size to Chicago 13 (or any other size for which no fixed-size Chicago is installed) and press a key shown here while also pressing the control key.

CURVE FITTING MADE EASY

Fitting a curve to a scatterplot of experimental data using the principle of least squares is easy using Microsoft Excel 4 with Solver. To employ this method, from Jay B. Winderman of Claremont, California, you must be able to determine the general form of an equation that will fit the overall shape of the scatterplot produced by charting your experimental data. For example, data that trends along a straight line would fit an equation of the form $y = Kx$, where K is a constant.

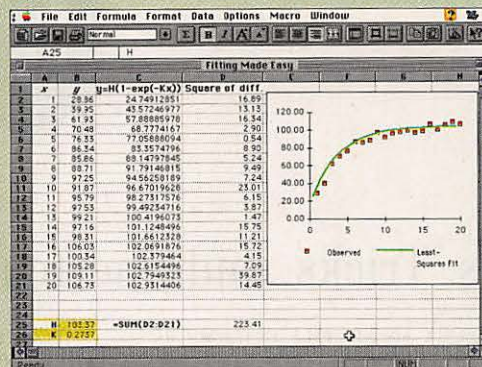
1. Enter the x and y coordinates of your experimental data in columns A and B of the spreadsheet, and create a scatterplot with the Chart Wizard tool. Inspect the scatterplot and decide the form of the equation that will best represent the data. In this example, the data could be approximated by an equation of the form $y = H(1 - \exp(-Kx))$, where H and K are constants to be determined (x is a value from column A, and y is the corresponding value from column B).

2. Guess values for the constants in your equations and enter them into two adjacent cells, such as B25 and B26, in one of the columns. Enter your curve-fit equation into cell C2, and fill down to the last row that's not empty in columns A and B. For example, the equation from step 1 would be the formula $=\$B\$25*(1 - \exp(-\$B\$26*A2))$.

3. Enter the formula for the square of the difference between the values in cells B2 and C2, which is $=(B2-C2)^2$, into cell D2, and fill down to the last row that's not empty in columns A and B. In a vacant cell (such as D25), sum the values in column D. In this example, the summation formula is $=\text{SUM}(D2:D21)$.

4. You now want to choose values for the constants in your equations to minimize this sum. This is where you use Solver. From the Formula menu, choose Solver. In the dialog box that appears put the cell location of the sum ($\$D\25 in this example) into the Set Cell box. Set the Equal To option to Min. Enter the cell locations of the equation constants ($\$B\$25:\$B\26 in this example) into the By Changing Cells box. Click the Solve button and await the outcome.

5. Eventually the values of the constants (cells B25 and B26) change, and the curve-fitting equation that incorporates these constants is the best fit to your experimental data: $y = 103.37(1 - \exp(-0.2737x))$.



er. The Locality menu only lists places with files in the Online Files folder.

That same folder contains configuration files for more than 30 modems, and each file uses 3K to 5K of hard drive space. You probably only use one or two different modems. By deleting the configuration files for the modems you never use, you recover 100K to 130K of disk space without harming the AOL program.

*David Wegener
Jacksonville, Florida*

Collapse While Opening

TIP Some of my fellow students like to expand all the folders on a hard drive using the ⌘-option-right arrow key combination, causing a lengthy wait while opening a folder. I avoid the

wait by having the Finder collapse the outline of a folder's contents when it opens the folder. Pressing the shift key while choosing Open from the Finder's File command (or pressing ⌘-shift-O) does the trick. So does pressing shift at just the right time after (not before) double-clicking the folder.

*Clint Beilman
Kissimmee, Florida*

Just as you can fully expand selected folders and all their subfolders by pressing ⌘-option-right arrow, you can fully collapse selected folders by pressing ⌘-option-left arrow. Similarly, pressing option while clicking the triangle next to a folder fully expands or fully collapses it. To avoid affecting subfolders, omit option from these combinations.—L.P.
continues

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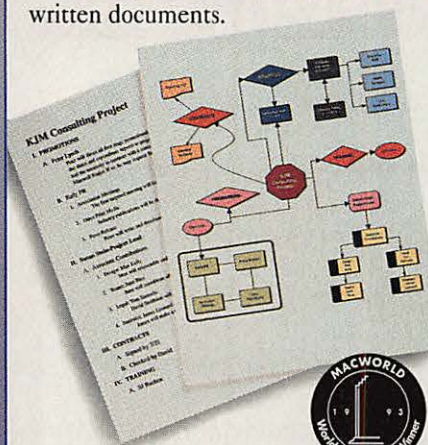
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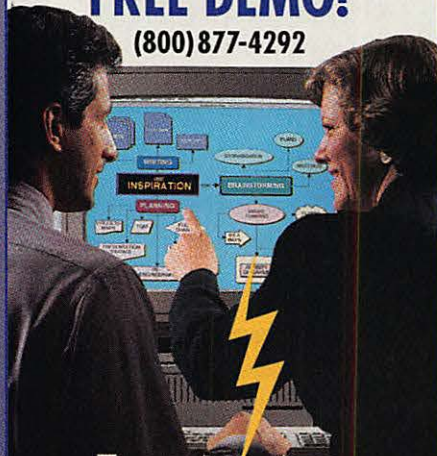
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MULTICOLOR REVERSE TYPE

You can reverse type on a color image in Adobe Photoshop 2.5 by following this simple procedure from Noah T. Winer of Burkettville, Maine. Using the type tool, place type in your document (Photoshop makes the type a floating selection). While the type is still floating, choose Composite Controls from the Edit menu. In the dialog box that appears, set the opacity to 1%, making the type transparent, and click



OK to dismiss the dialog box. Next drop the selection into the image by choosing Save Selection (or Defloat Selection) from the Select menu. Press **⌘-I** to reverse the colors in the selected area. If you wish, you can stroke the selection's edges to further highlight the type: set the foreground color in the tool palette to the stroke color you want, and use the Stroke command in the Edit menu. In 3.0 (which should be out by the time you read this), the procedure is the same, except that you set the opacity on the Layers palette (the Composite Controls command is gone).

Sort by Column in Word

TIP Microsoft Word 5.0 and 5.1 can sort the rows in a table in either ascending or descending order by any column without using another application. First you must select the column by which you wish to sort. If the table was created using Word's Table command (not simply with tabs), you can select an entire column by option-clicking it. If the table was created with tabs (not with Word's Table command), you can select a column by clicking at its upper-right corner, pressing option, and dragging to the lower-left corner of the column. To select a column in a long table that requires scrolling to get from top to bottom, click at one corner of the column, scroll to the other end of the column, hold down shift and option, and then click at the opposite corner. You do not have to select all the rows in the column; only the rows you select will be sorted. In a table made with Word's Table command, simply drag across the rows you want to select in the table. In a table made with tabs, use the option-click method described above.

With the selection made, choose Sort or Sort Descending from Word's Tools menu—or you can access them by choosing Commands from the Tools menu. In the dialog box that appears, select Sort or Sort Descending from the scrollable list at the upper-left corner, and click the Do It button to execute the command or click the Add button to add the command to a menu.

You can use the option key to select part of a column in a table made with tabs (not with Word's Table command), or to select any rectangular area of text that's narrower than the full width of the docu-

ment. Then you can apply normal editing methods to the selection, such as delete, cut, copy, paste, replace, or change font.

*Charles E. Carter
Atlanta, Georgia*

SimCity 2000 Update

Though the cheat "porntipsguzzardo" works only in SimCity 2000 version 1.0 (as described in a July tip), a similar trick works in version 1.1. First you click the map tool and type **pirm**. Then you click the status indicator (which shows the weather if no disasters are in effect) and type **topsguzzardo**. This trick, like its 1.0 counterpart, adds \$500,000 to the city's funds and allows access to rewards and inventions. However, if you use this cheat in a city before it reaches a population of 60,000, you will be unable to build a military base there. Again, as in 1.0, you need only type **ardo** to repeat the cheat. You must have the caps lock key off when you type the cheat, unlike the original SimCity "FUND" cheat.

*Matt Maier
Santa Rosa, California*

We pay from \$25 to \$100 for tips published here. Send questions or tips on how to use Mac computers, peripherals, or software (by mail or electronically) to *Quick Tips*, Lon Poole, at the address listed in *How to Contact Macworld* at the front of the magazine (include your address and phone number). All published submissions become the property of Macworld. Due to the high volume of mail received, we're unable to provide personal responses. **m**

LON POOLE answers readers' questions and selects reader-submitted tips for this monthly column. His latest book is *Macworld System 7.5 Bible* (IDG Books Worldwide, 1994).



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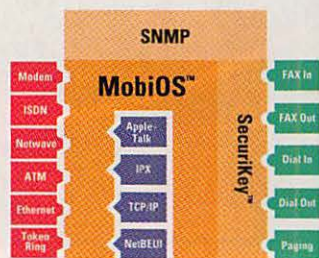


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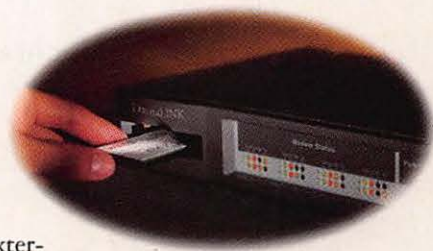
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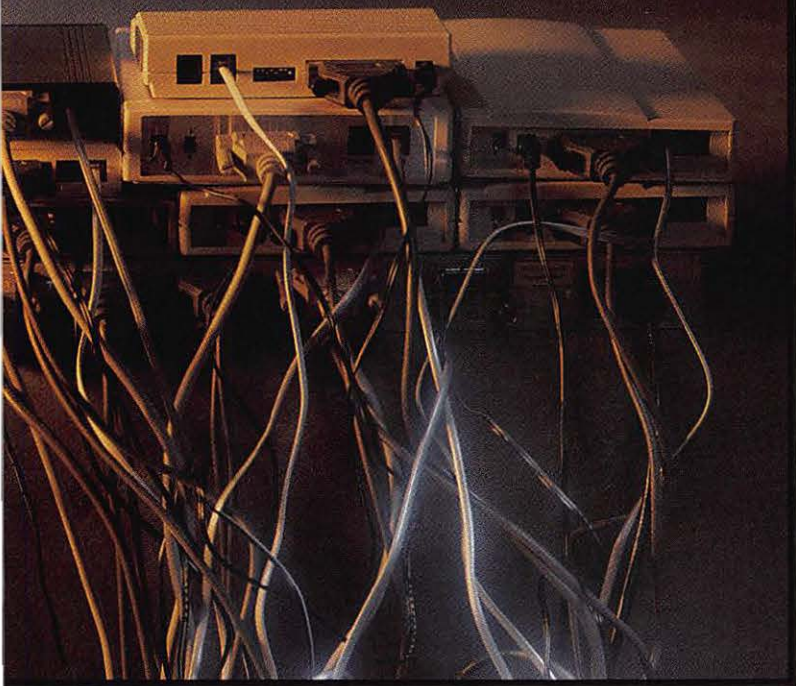
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THE LATEST IN CONNECTIVITY AND COMMUNICATIONS

Mail Call: QuickMail 3.0

YOUR MACINTOSH STILL WON'T make coffee, but it will sort your electronic mail: CE Software has added rules-based mail-management to QuickMail in its latest version, 3.0.

Under this system, the mail client uses a set of user-defined rules to automatically sort and respond to mail. Users can base rules on several criteria, including the sender, priority, message subject, and message contents. An urgent message from a specific person, for instance, could receive an automated reply, while normal-priority messages could be filed automatically. QuickMail 3.0's MailManager files, forwards, prints, deletes, or replies to messages as they arrive in the user's mailbox.

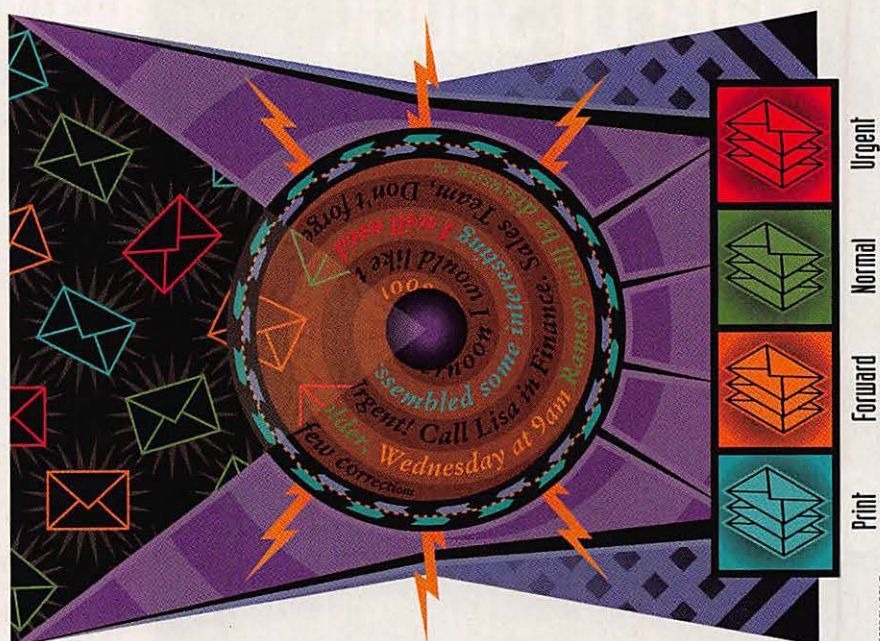
QuickMail 3.0 now sports a search engine—users can search message text, author, or just about any other field in messages that are filed in their personal folders. The client now supports up to 250 personal folders, with up to 250 messages per folder.

Other improvements in version 3.0 include a built-in spelling checker, the ability to import and export address lists, and a handy way to add items to your address book from incoming mail without retyping.

QuickMail holds the largest chunk of the Macintosh E-mail market, and CE Software is looking to hang on to it with this long-awaited update. QuickMail 3.0 is a client-only upgrade that, according to the company, peacefully coexists with earlier clients.

The company says that the next upgrade, which will revise only the QuickMail server, is not expected until the summer of 1995. QuickMail 3.0 is available for \$649 for a ten-user pack; current customers can upgrade for \$12 per user. CE Software, 515/221-1801.

—CAMERON CROTTY



Remote Access: The Next Wave

THE INTRODUCTION OF TRIBE Computer Works' remote-access computer signals a trend among server makers toward giving remote users more-flexible access to resources in multiple-protocol networks. Tribe's server supports AppleTalk over point-to-point protocol (PPP) instead of Apple Remote Access Protocol (ARAP).

The server, named TribeLink, boasts eight ports that support 57.5-Kbps or faster data transfer, as well as one AUI Ethernet connector. In addition to AppleTalk, the server can handle TCP/IP. The TribeLink will be priced at less than \$2000, with external modems priced separately.

By the end of the year Cayman Systems plans to add support for AppleTalk over PPP to its new GatorAccess MP remote server, which currently supports only TCP/IP and IPX.

Macs use ARAP to establish serial connections between remote computers and remote-access servers. PPP is a de facto standard used in the rest of the industry for handling serial communications over telephone lines. Easy-to-use ARA works very well for those who need only to reach a Mac server or pick up E-mail from an AppleTalk network. For users who must access non-Mac host computers—for example, to look up sales or inventory data from afar—PPP may be a better choice because it can handle more than one network protocol at once.

Apple will support PPP in the future as well, although not necessarily in a new version of ARA, as announced

last November. Meanwhile, Mac users can log on to a PPP server with InterCon's InterPPP remote-access client software (\$99.95) or a noncommercial equivalent.

Other server manufacturers have satisfied the varied needs of remote users by designing servers that support ARAP and other protocols in the same box, although not necessarily on the same phone line. By September, Asanté Technologies plans to release a \$99 upgrade to its NetConnect Remote Access Server that supports both Apple Remote Access 2.0 and TCP/IP. The new version will add zone-filtering security for AppleTalk users. The server, which comes in 8-port (\$4299) and 16-port versions (\$5999), already supports IPX and ARA 1.0.

By the time you read this, 3Com Corporation expects to have available release 5.0 of its AccessBuilder family of multi-protocol remote-access servers (called Centrum Remote 3000 before 3Com acquired Centrum Communications and its products earlier this year). The upgrade (\$500) will provide support for ARA 2.0 and incorporate an autodetect feature that lets Mac, PC, and Unix users call in to an AccessBuilder server by dialing a single phone number.

Telebit Corporation is already shipping a software release for its NetBlazer product family that includes TCP/IP access for Macintosh users. Mac users can run ARA and MacTCP over the same connection, and the software translates ARAP data into TCP/IP datagrams so that users can transparently connect to the Internet or to Unix-based host computers. Release 2.3 (\$249 to \$499) also includes new customized billing and security features.

LanRover 3.0 (\$250 to \$849) from Shiva Corporation, planned for summer 1994 release, also supports multiple protocols in a single remote-access server, so Mac, PC, and Unix users can dial in to the

same LanRover server. It can be managed from either a Mac or a PC, regardless of server configuration.

(For more on ARA servers, see the feature "Remote Access Arrives," which reports Macworld Lab test results for seven ARA servers.)

3Com Corporation, 408/764-8000; Asanté Technologies, 408/435-8388; Cayman Systems, 617/932-1100; InterCon, 703/709-5500; Shiva Corporation, 617/270-8300; Telebit Corporation, 508/441-2181; Tribe Computer Works, 510/814-3900.—MARTHA STRIZICH

Building Bigger, Faster LANs

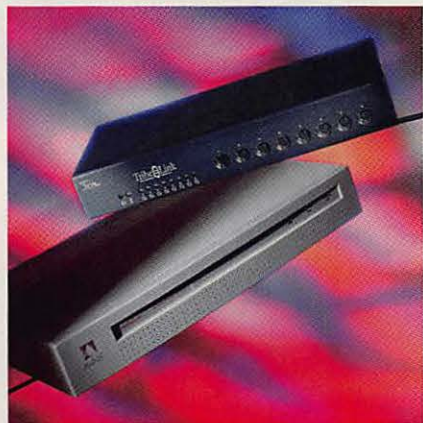
IF HUGE FILE TRANSFERS ARE SLOWING your network to a crawl, you may want to consider the new FastSwitch 10/100 AG, a combination Ethernet and Fast Ethernet switch that Grand Junction Networks released this summer.

You can use the FastSwitch 10/100 AG instead of 10BaseT hubs to build high-performance networks on top of existing Ethernet infrastructures. The switch uses 10-Mbps switching and Fast Ethernet (100BaseTX) technologies to deliver 10 Mbps of dedicated bandwidth to each user on an Ethernet network and 100 Mbps of dedicated bandwidth to each server. A single FastSwitch 10/100 AG supports up to 25 users, a dedicated 100-Mbps server, and 4 shared 100-Mbps servers or 100BaseTX hubs. You can also chain multiple FastSwitch 10/100 AG's together with Grand Junction's earlier FastSwitch 10/100 to construct a high-speed LAN of up to 200 users.

Fast Ethernet is an emerging standard that combines the FDDI (Fiber Distributed Data Interface) signaling scheme with standard Ethernet protocols to achieve lightning speeds of 100 Mbps. Switched Ethernet is a switching method that guarantees 10 Mbps of dedicated bandwidth to each desktop or device on an Ethernet network. Hub-based Ethernet networks provide users a shared network bandwidth of 10 Mbps.

Apple is developing a Fast Ethernet adapter card for the PCI-bus Power Macs that are expected to ship by mid-1995. In the meantime, Macintosh LAN managers considering a FastSwitch solution must use Sun workstations or EISA-bus machines with Fast Ethernet adapter cards as servers. The FastSwitch 10/100 AG costs \$8950, or \$298 per port. Grand Junction Networks, 510/252-0726.

—MARTHA STRIZICH



A new breed of remote-access servers, including Tribe's TribeLink (top) and Asanté's NetConnect, give users on multiprotocol networks more flexibility.

IN BRIEF

❶ The Power Mac Pace

Pacer Software's upgrade to its terminal-emulation and file-transfer program, PacerTerm 3.0 (\$249), works in native mode with PowerPC-based Macintoshes. It also supports PowerTalk and the Apple Drag and Drop Manager, along with remote access via PPP and SLIP. 508/898-3300.

■ Telecommuter Alert

Northern Telecom is introducing a Macintosh version of Meridian HomeLink with a choice of nine packages for telecommuters, including hardware, installation, and support and warranty for custom ISDN or switched 56 communications equipment and software. 800/684-2255; 800/208-0333 for Pacific Bell customers.

■ Nok Nok's New Address

The AG Group has acquired the Nok Nok, Nok Nok A/S, and Look-Out AppleShare file-server utilities. 510/937-7900.

■ SNA Update

Nearly all SNA•ps Macintosh-to-IBM host software users can upgrade to the latest version free of charge. Call Wall Data before August 31. 408/369-6900.

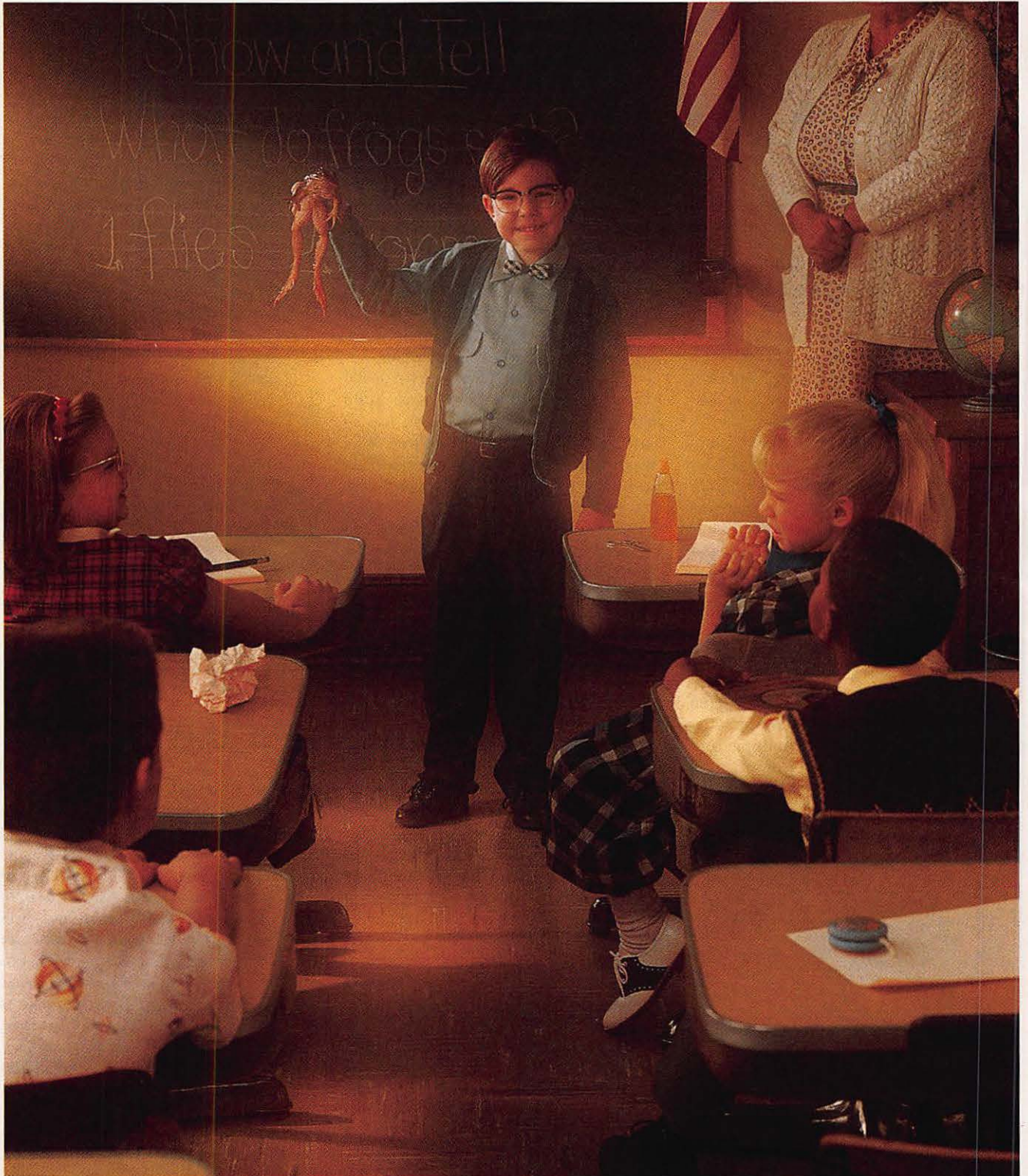
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—JIM FEELEY

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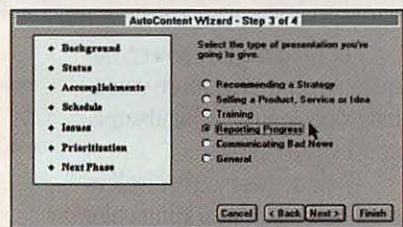
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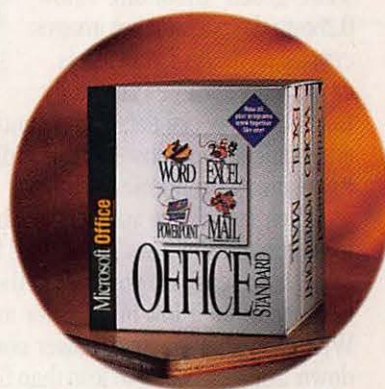
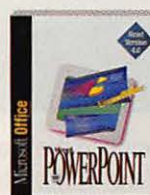
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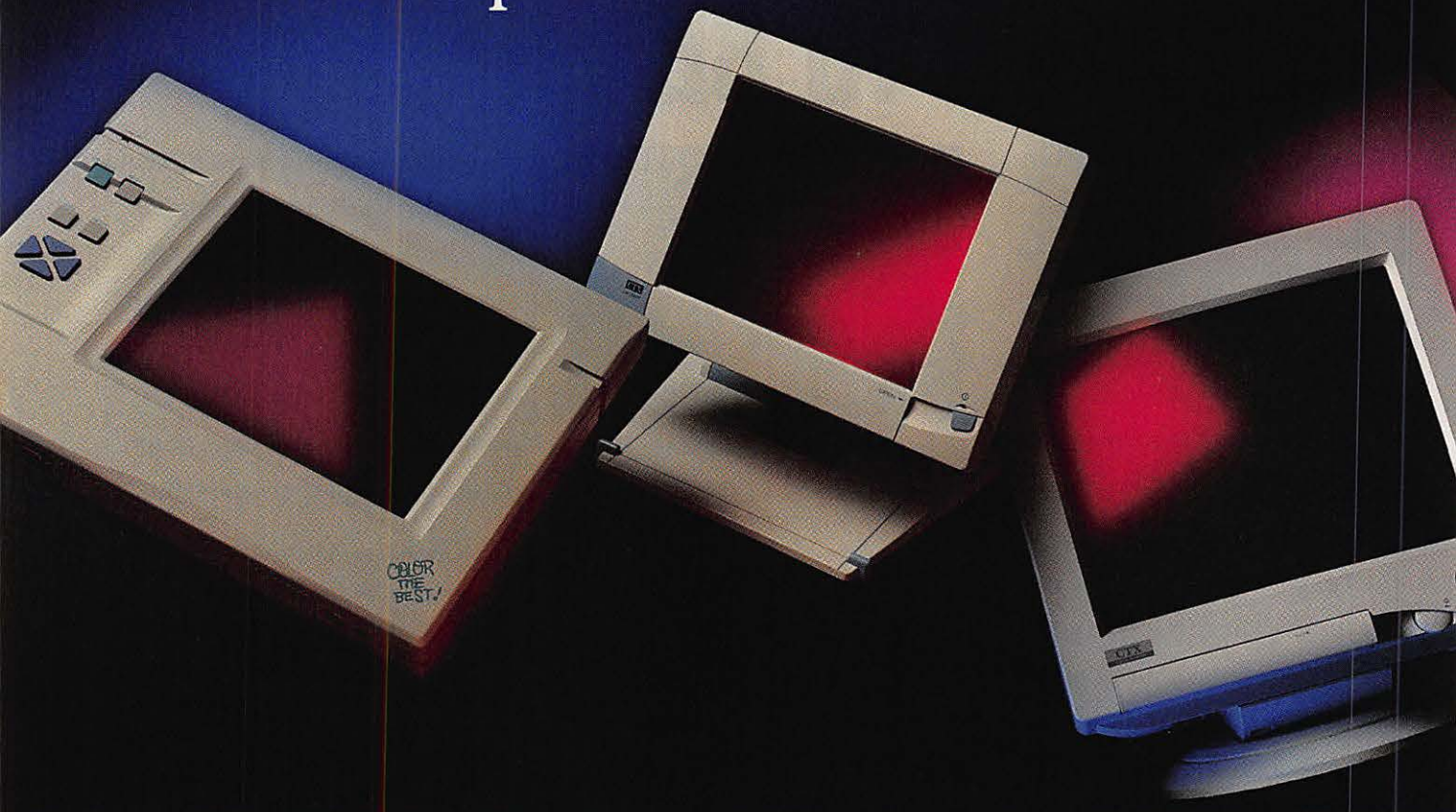
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MODEL	6468GM	1451GM	1462GM	1562GM	1565GM	1765GM	1785GM
Size	14"	14"	14"	15"	15"	17"	17"
Dot Pitch (mm)	0.28	0.28	0.28	0.28	0.28	0.27	0.26
Hor. Freq. (KHz)	30-38	30-50	30-62	30-62	30-65	30-65	30-85
1600 x 1280 NI	—	—	—	—	—	—	Yes(60Hz)
1280 x 1024 NI	—	—	—	—	Yes(60Hz)	Yes(60Hz)	Yes(75Hz)
1024 x 768 NI	87Hz/1	60Hz/NI	75Hz/NI	75Hz/NI	75Hz/NI	75Hz/NI	75Hz/NI
Mac Compatibility	—	—	Yes	Yes	Yes	Yes	Yes
Flat Square	—	—	—	Yes	Yes	Yes	Yes
Color Match	—	—	—	—	—	Yes	Yes
Digital Controls	—	—	—	—	Yes	Yes	Yes
MPR-II & ISO9241-3	Yes	Yes	Yes	Yes	Yes	Yes	Yes
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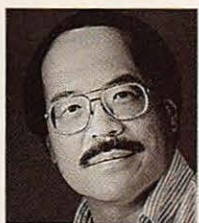
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Circle 38 on reader service card



BY CARY LU

PowerBook

Notes

Portable Storage

SOONER OR LATER YOU WILL RUN OUT OF storage space on your hard drive. You may think you can put off the day of reckoning by deleting files, but if you regularly fill more than 80 percent of your hard disk, it's time to start shopping.

Compression Schemes

The cheapest way to get more storage space is through software compression. Typically, that reduces document size an average of 50 percent; savings are somewhat less for programs and system files. Thus an 80MB hard drive might store 145MB compressed. The compression/expansion process takes time; the faster your computer, the lower the time penalty (working with some highly compressible files is actually faster than with uncompressed files since less of the disk must be read or written on). All compression schemes create some potential problems. I prefer compressing the entire disk to compressing selected files because a compressed disk behaves just like an ordinary disk as far as applications are concerned. I recommend TimesTwo for disk compression; 2.02 (the current version) is a vast improvement over version 1 (\$59 from Golden Triangle Computers, 619/587-0110).

All compression schemes have some problems, real or potential. The Read Me file for Connectix RAM Doubler reports incompatibility with TimesTwo based on two unconfirmed reports. In separate tests, both Connectix and Golden Triangle have reported no problems in running RAM Doubler and TimesTwo together. Connectix reports no problems with Stacker for Macintosh, another disk compression program (\$99.95 from Stac Electronics, 619/431-7474, 800/522-7822).



Replacing the Hard Drive

The best way to get more storage is to replace your internal drive with a higher-capacity model. The PowerBook takes 2.5-inch drives instead of the 3.5-inch drives of desktop Macs. By the time you read this, 1-gigabyte (1000-megabyte) drives should be available in the 2.5 inch size. You can easily find 500MB drives for about \$600 and 256MB drives for less than \$300. Aside from storage capacity and cost, what considerations can help you choose? The power consumption does not change in a simple way as the storage capacity goes up; some higher-capacity drives may consume less power simply because of their more recent design; others need more power because they have a second platter and more heads to move. The tighter tolerances in higher-capacity drives make them slightly less shock resistant than lower-capacity models.

Should you install a hard drive yourself? Only if you really know what you

are doing; many parts are small and the connectors delicate. Opening a PowerBook (or another computer) and installing standard components does not void the warranty, contrary to the commonly held myth, but if you do any damage, you are responsible. When you buy a new drive, make sure that you get any necessary shims or brackets. The position of a hard drive's mounting screws is not standard, although many brackets can be modified with suitable tools.

A new class of 2.5-inch hard drives measure 12.5mm high; they weigh about 2 ounces less and consume about 10 percent less power than the older 17/19mm-high drives. Because 12.5mm drives are just entering volume production, prices are higher and the capacities available are not as high as in 17/19mm-high drives.

What to Do with the Old Drive

If you replace the hard drive in your PowerBook, what should you do with the old drive? You can install it in a desktop Mac with the \$29 Hard Drive Adapter Kit, a 2.5-to-3.5-inch adapter bracket and cables from MacUpgrade Specialists (714/362-5429, 800/266-3622). But chances are that if the drive is too small for your PowerBook, it's also too small to be a primary drive for your desktop Mac. In some desktop Macs you can install it as a second hard drive if you can improvise a way to mount it (Velcro works great). A 2.5-inch drive can also be installed to store PostScript fonts inside a LaserWriter Pro 630 with the LaserWriter Pro 2.5" Drive Kit, a \$26 bracket-and-cable kit from ProLine Distribution (415/461-2227). ProLine supplies no instructions with its kit; installation isn't

continues

difficult provided you know how to open the printer and plug in the cable correctly. APS Technologies (816/483-6100, 800/233-7550) has a \$69 kit that does come with instructions, the LaserWriter Pro 630 Bracket Kit. One quirk: the Conner 20MB and 40MB drives, very common in early PowerBooks, rarely work in a LaserWriter Pro.

The modified SCSI termination used in internal 2.5-inch hard drives can cause some difficulty; keep any SCSI cabling as short as possible and review the Power-

battery power; APS claims three to five hours for its models.

If you buy a battery-operated external drive, make sure you get driver software that allows the drive to sleep. (If you buy a Liberty drive, ask for Casa Blanca Works Drive7 software.) If you travel internationally, look for 100-to-240-volt power supplies.

Cartridge Drives

Two drives offer unlimited storage if you add in cartridges. SyQuest's purely

CD-ROM drives for PowerBooks that weigh in at 2 to 3 pounds with batteries, cable, and AC adapter. MediaVision (510/770-8600, 800/845-5870) uses a Matsushita CD-ROM drive in its Reno; the \$349 price includes a rechargeable NiCad battery. CD Technology (408/752-8500) uses a more robust Toshiba mechanism in its CD Porta-Drive T4100; the street price is \$360, and a NiCad battery pack is another \$100. Both drives can play audio CDs on their own without connection to a computer. The Reno

Comparing External Storage Devices

External drive type	2.5-inch hard drive	3.5-inch hard drive	230MB MO drive	270MB SyQuest drive	200MB SyQuest drive
Weight in Liberty case	0.6 pounds	2 pounds	2 pounds	2 pounds	4.5 pounds
Mean time before failure *	150,000 hours	250,000 hours	30,000 hours	100,000 hours	60,000 hours
Shock rating (nonoperational) *	110 g	75 g **	50 g	80 g	45 g

g = gravity. * Typical figures quoted by manufacturer. ** 50 g for 1-gigabyte and larger drives.

Book manual carefully for information on external termination.

External Drives

An old or new hard drive can be operated as an external drive on a PowerBook or desktop Mac (the Conners have been troublesome here also). One common case style is just big enough for the hard drive and pass-through DB-25 SCSI connectors; this type of case can get power from either an AC adapter or the ADB port. The ADB port in a PowerBook does not provide sufficient power for hard drives (and a desktop Mac with an ADB accessory or two may not provide enough power either). ProLine sells such a case with a zippered pouch for \$109. Several companies sell external hard drives mounted in the case; for all these drives, you must use the AC adapter, so the drives aren't as portable as a PowerBook.

Other drives come in cases with an internal battery pack. Liberty Systems (408/983-1127) has the smallest of such cases, which include not only a battery but also an AC power supply/charger so you don't have to carry a separate AC adapter. For a 2.5-inch hard drive, the case takes up only 30 cubic inches; for 3.5-inch drives, 52 cubic inches. The elegant packaging comes at a price, however; Liberty charges up to twice as much as competitors for the same storage capacity. The competitors include APS, whose SR-1000 Drive Enclosure takes up 94.5 cubic inches and needs an external AC power brick (the case is sold separately for \$89 in an AC-only version, \$139 with a rechargeable battery inside).

Liberty says its external hard disk drives will run for up to four hours under

magnetic 3.5-inch 270MB cartridge competes with the 230MB magneto-optical (MO) drives made by several companies. (The now-obsolete SyQuest 105MB and MO 128MB cartridge drives are still on the market.) The MO drives cost several hundred dollars more, but the MO disks are \$10 to \$20 cheaper than SyQuest cartridges. The price difference is partially offset by the greater capacity of the SyQuest cartridges; the bulk matters only if you carry a lot of data.

The SyQuest drive is putting up a surprisingly strong fight against the new magneto-optical technology. The SyQuest drives are faster, and the company claims higher shock resistance and longer rated life. The real question, though, is cartridge reliability. SyQuest claims that the improved design of its 3.5-inch cartridges has overcome the problems of its larger, 5.25-inch cousins. The magneto-optical drive vendors claim a 30-year data lifetime for their cartridges based on accelerated aging tests, but no one really knows how long they will last. Neither MO nor SyQuest has a perfect record for storing data.

Both the SyQuest and the magneto-optical drives run continuously; neither drive sleeps. Liberty Systems is apparently the only company that offers both SyQuest and MO drives with optional battery operation.

CD-ROM Drives

For software or data that comes on a CD-ROM, you need an external CD-ROM drive. You can use any CD-ROM drive with a SCSI interface, as long as you have the appropriate software drivers and cables. Two companies sell portable

runs for 90 minutes and must be on a horizontal surface; the Porta-Drive runs for two hours on a battery charge in any orientation.

Many CD-ROM titles require a 256-color monitor. That's no problem for a color PowerBook or if you have an external monitor, but what if you have only 16 or 64 grays on your PowerBook's built-in screen? You can trick the system into seeing more. Connect the video-output cable to an adapter plug that tells the PowerBook that a color monitor is attached; a \$7 VGA cable adapter is the cheapest. Don't connect to a monitor. In the PowerBook Display control panel, set video mirror mode; in the Monitors control panel, set the nonexistent external monitor to 256 colors. Restart, and software that requires 256 colors will now run; you will see a gray-scale image that mirrors the nonexistent color image. There are three problems: First, this setup works only with AC power or an external battery (a PowerBook will not drive an external monitor on internal battery power). Second, on a 100- or 200-series PowerBook, the monochrome screens show only 640 by 400 pixels, not 640 by 480. And finally, some software manipulates color palettes, so you may see only foreground activity, not the entire image.

After you have installed a gigabyte hard drive and some external devices, your storage problems should be over for at least six months or so. Then you'll want more. **m**

CARY LU is a *Macworld* contributing editor who covers mobile- and remote-computing issues in this monthly column.

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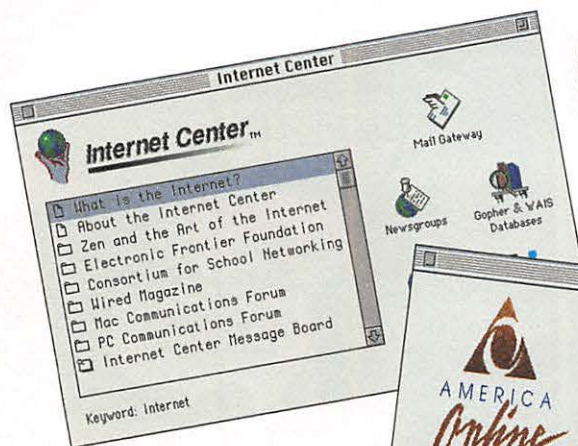
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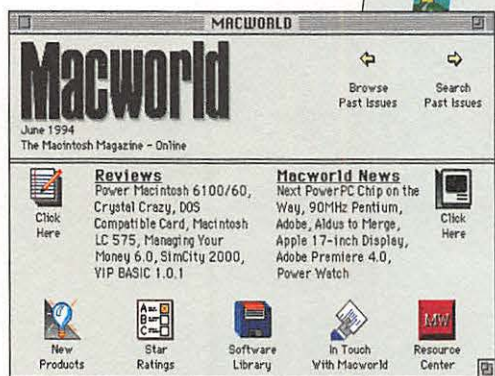
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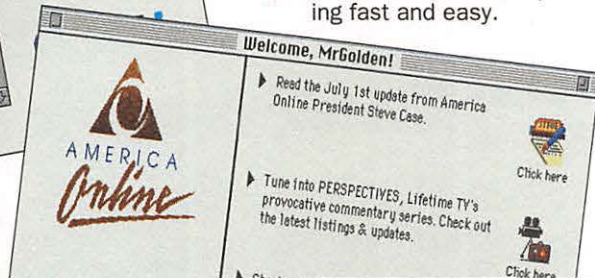


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An Intersection of Hells

Is decent fax software too much to ask for?

CAN'T ANYBODY SAY ANYTHING nice about fax software? Apple's Express Modem software gets almost no respect. QuickLink II and BackFax were quietly hustled off the market. STF Technologies' lack of response to tech-support pleas—be they by phone, fax, or skywriting—has generated enough customer venom to poison the Pacific.

Actually, it's partly a public perception problem. We clamor for just one really solid, well-designed fax program, but we don't grasp the difficulty of the challenge. See, when programmers write a screen saver, it has to be compatible with merely 90 Mac models. When they write fax software, though, it has to work with 90 Mac models, *and* the 200 fax-modem models that might be attached, *and* the thousands of quirky, aging fax machines they're supposed to dial, *and* the billions of software programs you might be using. No wonder one harried product manager calls fax software "the intersection of a lot of hells."

Giant disclaimer: no matter which fax software you wind up with, the following Bitter Truths will haunt you. One, you will not be able to fax PostScript graphics. Got that, QuarkXPress fans? Unless you buy add-on interpreter software (expensive and slow), your PostScript and EPS artwork will become only a blank spot, a blotch, or a system crash. Two, every fax-modem program conflicts with one system extension or another. And three, there will be a fax machine, somewhere, that can't talk to your fax modem at all.

Now that I've sufficiently got your spirits up, let's dig in.

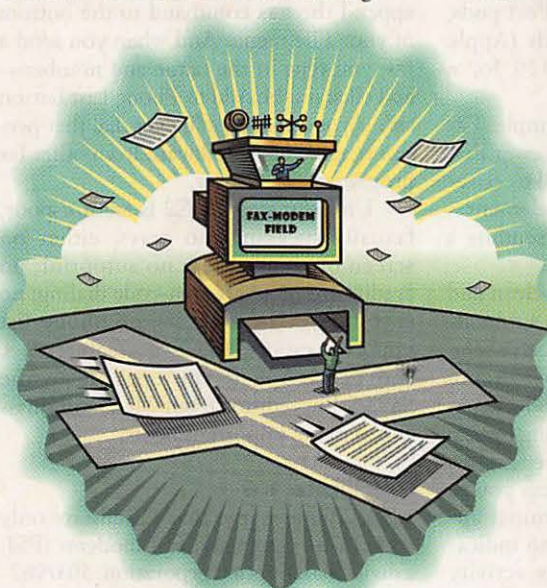
Faxstf 3.0

For years, dozens of manufacturers have included Faxstf software with their fax modems. Then came 3.0, the first version that STF Technologies has sold directly to individuals. It works with more than 150 modem models, and it's dirt cheap (\$59; 816/463-7972).

Without question, this software sends better-looking faxes than any other pro-

gram. Photos arrive in stunning shades of gray; hairlines are hairlines; rotated text is easy to read. Faxstf includes features 1, 7, 8, 10, and 11 (see "Fax Featuritis," which I'll use to conserve verbiage). With the optional \$89 AutoPak, you also gain feature 9, which sends incoming faxes to your printer automatically. It's like having a real fax machine, but with nicer paper and darker ink.

The AutoPak also gives you feature 4, optical character recognition, but don't get excited. Few incoming faxes have the clarity and perfect alignment required for decent accuracy (that goes for all programs reviewed here). Another caveat: Faxstf's Line Manager purports to distinguish between remote-access and fax calls, but it works only with certain modems—ten models, at this writing.



Now the bad news. I'll forgive, for the moment, Faxstf's window-mad interface, its reckless clutter (two desk accessories, two applications, two extensions), and its surprising lack of feature 2.

The real problem is getting help (beyond the grammatically appalling manual). Fax software is a technical trauma to begin with. Throw in a Faxstf population explosion, stir in the personnel vacuum of a rural, silicon-free valley in Missouri, and you've got yourself one giant busy

signal. In brief, this terrific technology begs to be backed by a better business.

Delrina FaxPro for Macintosh 1.5.1

This software, too, works with hundreds of modem models (including Global Village modems and even GeoPort pods), and it offers features 1 to 12, making it the only other fax software (along with Faxstf) that can send gray-scale faxes.

There are nits to pick: I'd rather confront one dialog box, not two, before a fax gets sent; the Comments blank has no business hiding out on the recipient's fax-number screen; and, exactly as with Faxstf, there are so many components, you don't know where to look for a certain setting or feature.

But otherwise, Delrina FaxPro is a class act (Delrina Corporation, 800/268-6082; \$129). The Installer is a prime example: it even tells you precisely which components it put where. Furthermore, if you do run into trouble, Delrina's phone-help staff is jaw-droppingly good. And you can reach them.

Bottom line: you have two months to discover whether or not your particular wacky Mac-and-modem setup likes Delrina. If not, you get your money back—a no-lemon pledge.

Global Fax 2.0.8

I've always wondered why people call some software *elegant*. I mean, does it put

on pearls and go to the opera?

This software works only with PowerBook, Duo, and Global Village (GV) modems. When I tried it, I learned that elegant, in large part, means *simple*. The only GV software you encounter, for example, is one desk accessory and a control panel. Viewing received faxes (in gorgeous gray scale) is easier and faster than in any other program; you do it in a single, well-organized window. When you

continues

want to send a fax, you encounter only one dialog box, complete with your phone list.

Despite its sleek frame, Global Fax (\$129 for the Duo software only; Global Village Communication, 415/390-8200) packs all features except 1, 5, and 6. (Only Gold and Mercury models offer OCR.) Feature 1 is the only one to worry about, really; when you send a photo, your recipient gets a blobby black smudge. Another drag: GV tech support is great, but tough to reach and slow to respond.

But more than any other fax software, the GV stuff feels solid and integrated. You don't get the uncomfortable feeling that you've just installed an archipelago of software pieces all over your Mac. When faxing, for example, you don't have to open a window just to see what's going on—instead, a progress graph appears on your menu bar, clear but out of the way. If all programs were this elegant, they'd raise their champagne glasses.

Express Modem 1.5

Apple's own efforts with writing fax software had a reputation for unreliability. However, through a parade of software updates, Express Modem finally approaches respectability. Note well: you must acquire the correct strain of this software; there are separate versions for PowerBooks, Quadra AV GeoPort pods, and Power Mac GeoPort pods (Apple Computer, 408/996-1010; \$129 for a GeoPort pod with software).

And how is it? Clean and simple. Fax Terminal lists all faxes, Fax Viewer displays them, and Fax Cover makes cover pages. The only other interface element is the dialog box you see before sending a fax, a simple phone-book list.

Alas, Express Modem is *too* clean and simple. Sure, I can live without automatic printing and OCR. But you can't send gray-scale images; Express Modem doesn't omit the local area code when dialing; and the credit card dialing option is super awkward. What's left are features 2, 5, 6, 8, and 12. Worse, unless you're actually running the Fax Terminal application, you have absolutely no indication (audio or visual) that fax activity is even taking place.

MacComCenter Plus 1.02

Ever hear of QuickLink? It came bundled with certain modem brands, and it was pretty lousy. Its heir, still available only with specific modem brands (such as Practical Peripherals), is called MacComCenter, cleverly abbreviated MC2, and it's a thousand times better (Smith Micro Software,

FAX FEATURITIS

All fax modem programs let you schedule outgoing faxes; send and receive in the background; have multiple phone books; export received faxes as graphics files; send one fax to multiple recipients, or multiple documents in one faxing; keep a log of all faxes; forward a received fax to another fax machine; flip a received fax upside down; and magnify or reduce on-screen faxes.

Of course, you also get the gigantic main attraction of fax modems: faxes you send simply look much better, on the receiving end, than faxes sent by an actual fax machine.

State-of-the-art fax software, however, offers more sophistication. Here, in one man's order of relevance, are the top dozen Features of Today.

1. Sends gray-scale images, such as photos
2. Offers stunning antialiased (gray-scale) viewing of received faxes
3. Intelligently omits the local area code when dialing
4. Can turn received faxes into an editable text document (fax OCR)
5. Works on Power Macs, Quadra AVs, and GeoPort Adapters
6. Can rotate a received fax 90 degrees
7. Dials credit card dialing sequences
8. Can switch to fax manually during a voice call
9. Automatically prints received faxes
10. Imports and exports tab-separated phone books
11. Includes a quick-fax program for whipping up short typed faxes
12. Uses Apple's Communications Toolbox software (for greater reliability and compatibility, especially as Apple releases new Mac models and system software)

714/362-5800). Nice touches: instead of making you press certain keys to make your Print command say Fax, MC2 can append the Fax command to the bottom of your File menu. And when you send a fax, you type in the name and number—and click on the Add to Phone List button *only* if you expect you'll ever dial that person again. That's backward from other fax programs—and better.

Unfortunately, MC2 is feature-poor, faxually speaking: no grays, either on screen or transmitted; no autoprnt; no credit card or smart area-code dialing; no customized cover sheets; no phone-list import or export. You do get features 6, 8, and 11 (and 4, if you upgrade to the \$69.95 Plus edition), but MC2 still misses too many important boats.

Faxcilitate 1.6

It's a crying shame that Faxcilitate only comes with Supra and PSI modems (PSI, a division of Supra Corporation, 503/967-2410). Where most fax packages scatter their components to the four corners of

your hard drive, Faxcilitate adds a simple Fax menu to your menu bar. Its commands access everything you'll need: the Fax command itself, cover-sheet maker, In and Out boxes, and all. While it may be a mainly cosmetic overhaul (and it is; the underlying software is actually Faxstf 2.23), the psychological sense of control it offers is tremendous. You know where everything is, and you can forget about holding down certain keys to fax.

The rest of the package is equally well done—particularly the manual. Version 1.6 includes features 2 to 7, 10, and 11 (key missing feature: gray-scale faxing).

The Upshot

Which do you prize most—features or clarity? If you already own a modem, Delrina FaxPro fairly creaks with features, and buying into Delrina's tech support and guarantee is confidence-inspiring. On the other hand, if you haven't yet bought a fax modem, you wouldn't be crazy to consider a Global Village or PSI/Supra model for the crystal-clear software alone. Life won't be an effortless romp, per se, but at least you'll get your fax straight. **m**

Thanks to Atlantic Computer Systems for the GeoPort pod.

Contributing editor DAVID POGUE is coauthor of the best-selling, 1100-page *Macworld Mac & Power Mac Secrets*, second edition (IDG Books Worldwide, 1994), which would take 47 consecutive days to fax.



What a Difference a Gray Makes The importance of feature 2, gray-scale display of received faxes: without it (right), you simply can't read most faxes on the screen.

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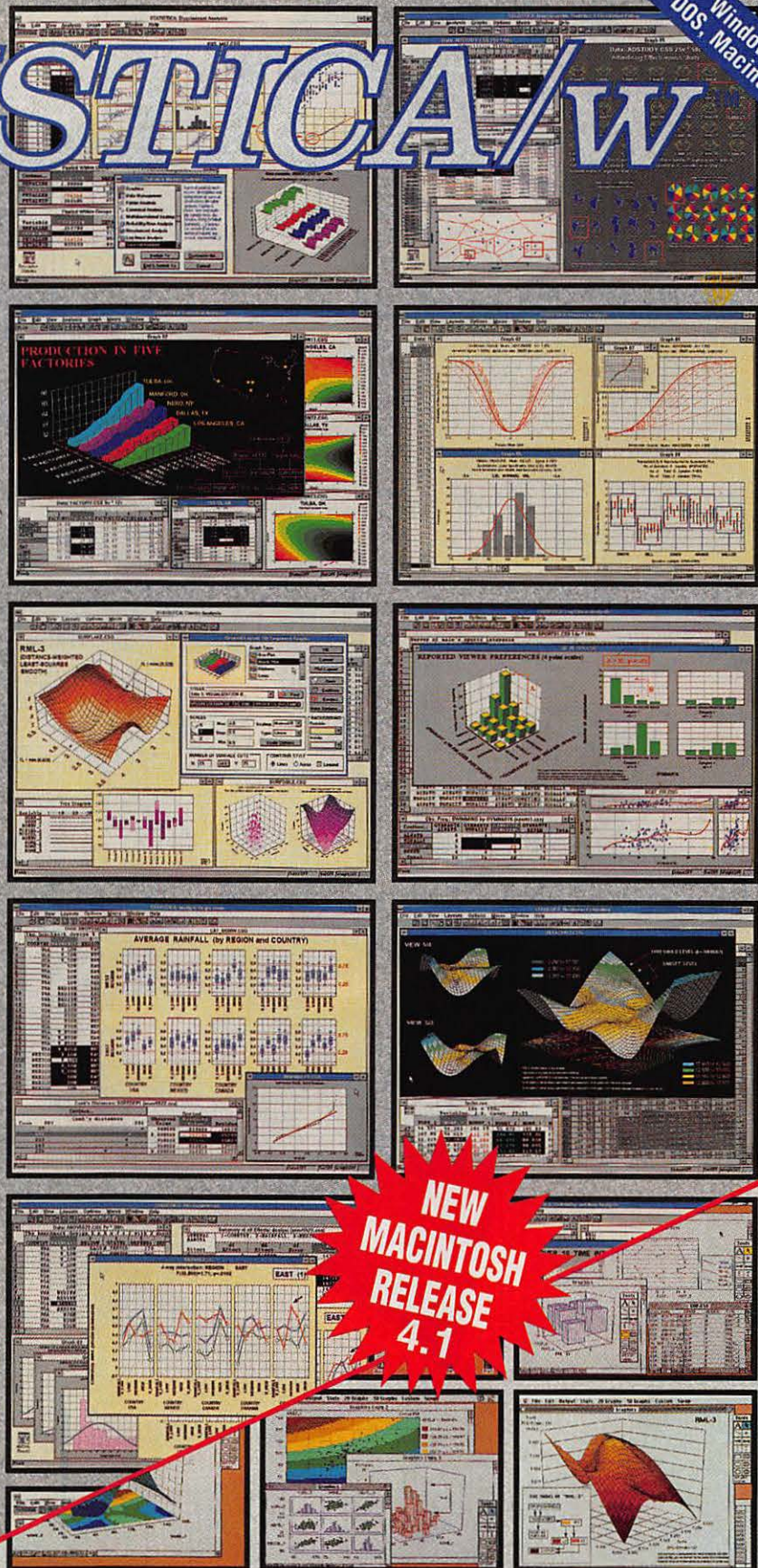
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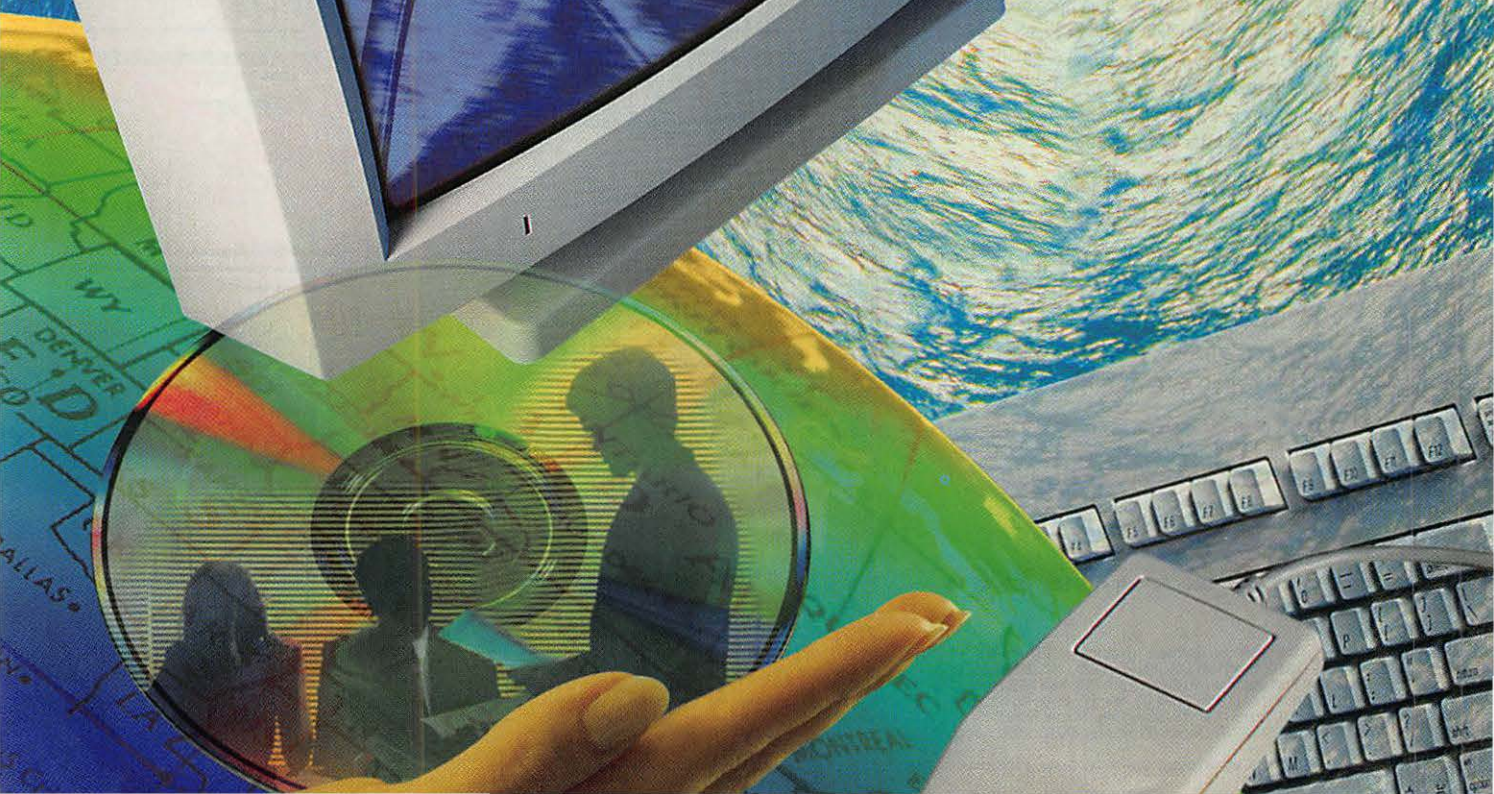
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44. ☐ Macintosh Classic Series/LC Series
45. ☐ Macintosh Powerbook Series/Duo Series
46. ☐ Macintosh II Series
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48. ☐ Macintosh Centris Series
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DO YOU RECOMMEND, BUY, OR APPROVE MICROCOMPUTER SOFTWARE AND/OR PERIPHERALS?

54. ☐ Yes
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IF YES, PLEASE INDICATE FOR HOW MANY MACINTOSH COMPUTERS YOU HAVE THIS INVOLVEMENT.

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57. ☐ 11 - 25
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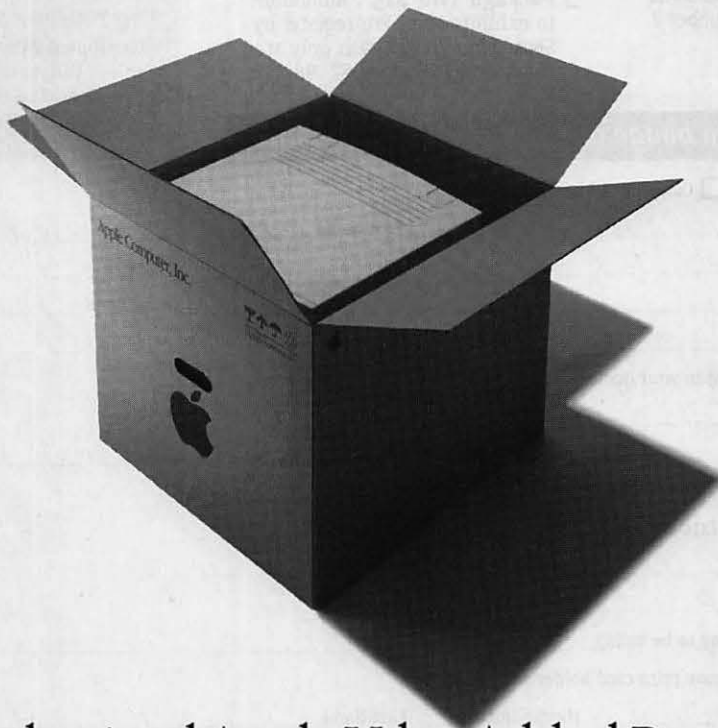
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Better than TV?

Generation Z is growing up with the computer

AS FAR AS THE EDUCATION market is concerned, computers have had a shockingly free ride. It's sort of a hangover from the days when we didn't understand computers at all, and very few of us ever went near them. Because of the computer's scientific pedigree, we figure, using it should be an enriching experience for the playground set.

We even consider using a computer a virtue in and of itself—ergo, the somewhat oxymoronic phrase *computer literacy*.

Does this mean we can guiltlessly use our Macintoshes to take the place of television as an object of kiddy contemplation? Not by a long shot. I speak here not only as a technopundit, but also as a concerned parent. In our household resides a four-year-old named Andrew who seems to have inherited my own consuming passion for junk entertainment. My own parents, being of prewar vintage, had no idea what consequences would come from allowing me unfettered access to that black-and-white box in the living room. Thus I cannot fault them—or their generational peers—for bringing up a wave of triviaheads, logic dolts, and instant-gratification freaks.

Even as I write these words, my eyes wander to my collection of lunch boxes celebrating the likes of "The Man from U.N.C.L.E.," "Laugh-In," and "Charlie's Angels." (Does anyone have an "It's About Time" pail in good condition? Just asking.) Somehow, I don't think this is what my great-grandparents had in mind when they arrived on Ellis Island.

So I know better than to fully entrust my kid to a new technology. The question is, Can I do any better than my parents? Television rots your mind—that much is clear—but what about computers? Can the new wave of smart-and-entertaining programs not only instruct our kids but also give them an alternative to the boob tube? Can computers save Generation Z?

I imagine these questions will ultimately be answered by psychologists and professors trying, no doubt, to puzzle things out in the wake of massive cogni-

tive damage caused by the Virtual Reality Woodstock of the year 2010. But in the meantime, let me offer the following warning: Children who spend too much time using so-called educational software may learn some unexpected and probably unwelcome lessons. At least that's the conclusion I reached from observing my own youngster as he began growing up with the Macintosh.

Slam Dink

At age two, Andrew's favorite program was Rodney's Fun Screen. It taught him how to use the mouse. For a two-year-old, this is not entirely intuitive. While a mouse is correctly called a pointing de-

goes through a door of a Victorian-style house with about 20 windows, and he pulls down the shades of each window. Then you look for him. By moving the cursor over each window and clicking on it with your mouse, the shade goes up and you see a weird animal or something. "Not here!" says Dinky, unseen. Finally, you click on the right window and find Dinky. Happy music ensues.

This is the same type of joy one gets from those pop-up toys. Psychologists approve of those things because they teach about feedback. Well, Rodney's Fun Screen has more feedback than Pete Townshend's amplifier. If there is a lesson to be learned about feedback, surely it is learned most effectively in the digital realm.

But there is a disquieting aspect to the Fun Screen that is characteristic of many engaging software packages. While Andrew's reaction to pop-up toys was to play with them for a short time and then go on to other stimulations, he could sit in front of the computer for an hour, looking for Dinky. An unnerving sight, to be sure—reminiscent of the zombie-ish lure of television. The fact that my son was delighting in the results of his own actions ("I found Dinky!") didn't totally mitigate my concern that he had discovered the equivalent of a new drug. Or, at the least, too much of a good thing.



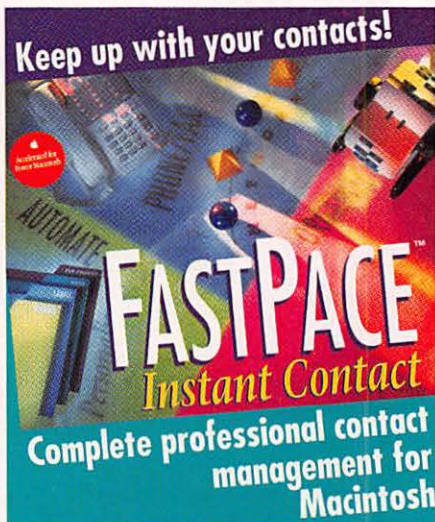
vice, and even babies know how to point, the fact is that one usually lifts a hand when pointing. A mouse, of course, requires you to keep your hand down, but Andrew kept lifting it off the desk.

Rodney's Fun Screen (from Activision), designed by a wonderful New York artist named Rodney Greenblatt, solved the problem. One of the components introduces a character named Dinky, who is sort of a cross between Gumby and Pee-wee Herman. "I am Dinky, and this is my house!" he says in a breathless Alvin-and-the-Chipmunks voice. The Dink Man

Hit Pix

Kid Pix (Brøderbund Software) is the wildly successful drawing program for the junior set. And as Andrew showed, it is definitely easy enough for a three-year-old to master. He found it exhilarating to experiment with different brushes, colors, and effects, and I was quite impressed watching him use the menus and palettes to do so. Even more amazing were the results: after I would walk away from the screen for a few minutes, I'd return to see something unbelievably polished.

continues



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Would access to such a powerful drawing tool affect Andrew's work in the more traditional media of paint and paper? Would he eschew crayons because they had no erase function? Happily, the answer was no. He returns from preschool regularly with the crude graphics associated with his age group. Interestingly, he seems much prouder of these pictures than of the astonishing creations that emerge from the laser printer, and his paintings now overshadow the Kid Pix pictures magnetized to the refrigerator.

Perhaps this is related to a development that effectively ended my son's creative period with Kid Pix. Once he discovered the firecracker-erase function, he never worked at a single picture long enough to develop something notable. After only a few minutes, he'd go to the menu where the firecracker lived and blow up his artwork, laughing heartily as the image shattered into digital pieces.

Day of the Living Book

Living Books (Brøderbund) are interactive versions of the real thing, and Andrew fell in love with *Grandma and Me*, an adaptation of a work by author Mercer Mayer. Though he can opt to have the story read to him line by line, Andrew prefers to circumvent narration, treating each page as a new adventure and delightfully clicking on every component to evoke an entertaining animation. He loves to do this so much that he can easily spend 40 minutes with the program with no supervision, laughing at the visual jokes just as hard when he sees them for the 50th time as he did the first.

Obviously, these products are not meant to substitute for real books—which, of course, are also “living” and interactive in the sense that they can engage minds and trigger imaginations. But just try to occupy a small child's attention for an hour with a printed copy of a Mercer Mayer book. It can't be done.

Using Living Books involves a trade-off. Obviously, the programs can't replace the wise presence of a human reader who points things out along the way and answers questions. Instead, they offer an opportunity to surf a book's text instead of reading it. They give kids the equivalent of a television's remote-control device, allowing them to zap anything that fails to instantly engage them.

Car Talk

Putt-Putt Joins the Parade (Humongous Entertainment) is an adventure game that requires no reading. The title character is a talking automobile who wants to ride in a parade. But first he must acquire some goods and get washed. To do that, he

makes money by delivering groceries and mowing lawns. Andrew eats it up.

Putt-Putt communicates the importance of planning complex tasks, and I was quite proud of my little guy when he skillfully completed the chores necessary to get Putt-Putt in the parade. But Andrew plays the game too damn much. He can go at it for several hours—or until I drag him kicking and screaming from the computer. Is he working out the problems in a logical fashion, or simply entering a somewhat more interactive fugue state than the television mind-set? While much of Andrew's time was, no doubt, spent constructively in the first hours of interaction, eventually I sensed a change in his play. He would stop working at the problem and simply surf the program for his favorite little animations.

All in all, I've found that the computer more than matches TV as a baby-sitter. Let's face it, the illusion that something not only entertains your kids but educates them as well is so incredibly potent that you really don't want to look too closely.

But as Andrew's hours in front of the Mac piled up, I was forced to take that harder look. I simply couldn't ignore the possibility that he might be learning some lessons totally unanticipated by the companies that designed the programs. Compared with television's passive distraction, computer entertainment seemed to prod Andrew into a kind of interactive cherry-picking. The constant in all these programs seems to be that they encourage discovery of momentary delights, most often in the form of special effects. They take the ability to experiment—a good thing in general—to the limit, to the point where it impinges on other virtues, such as learning to follow a narrative, or carefully executing a lengthy plan. This can't be good. So despite Andrew's cries of protest, I now limit the time he spends with the Macintosh. And when he does use the Mac, I'm often there with him to provide some measured commentary to what's happening on screen.

But there's only so much I can do. If my vigilance (and that of other parents) fails, it may be that my son's—and his generation's—excessive interaction with computers will lead to some disturbing behavioral anomalies, even weirder than the teratologies of the television generation. Beyond TV lunch-box collections, beyond the cult of “The Brady Bunch,” may lie a future *Newsweek* cover story castigating our children as representatives of “The Undo Generation.” ■

STEVEN LEVY's latest book is *Insanely Great: The Life and Times of Macintosh, the Computer That Changed Everything* (Viking, 1994).

Circle 49 on reader service card



Desperately Seeking Security

Protect your data from prying eyes

PROTECTING BUSINESS INFORMATION is important—so important that large companies with mainframe computers often employ professionals to ensure the security of corporate information systems, including networks, computers, and electronic mail.

Such attention to security may be a new idea to managers who rely on Macintoshes rather than mainframes to keep their companies humming. But as the single-user Mac has given way to companywide networks, it's important to consider the value of your company's information and to determine how best to protect it.

Many security products are available to help protect your hardware and data from theft or loss. But without planning, individual products may not be enough to safeguard your company's information. To learn about the type of Macintosh security products that are available, look to Jim Heid's *Working Smart* column in this issue. To learn how to manage the security of your data, read on.

Security Risks

The six enemies of computer security are error, ego, enmity, embezzlement, extortion, and espionage, according to Bruce Schneier, security consultant and author of the excellent *Protect Your Macintosh* (Peachpit Press, 1994). People and computers may lose data through simple errors or hardware failure. Or individuals may break into a system because they want to feel important, or because they're angry, greedy, or represent a rival business.

Obviously, intruders can be a real problem. But human error is by far the greatest security risk. Recently, for example, while browsing online, I discovered a confidential wholesale price list for a hardware company's products. Clearly the information had been posted by mistake; just as clearly, its public dissemination could harm the company's business.

Such an error can't be caught by a software program, but the risk can be reduced if you establish a review system for files that will be posted online. Make sure someone cruises your bulletin board system or online forum periodically, to catch anything that slips through. If your forum or BBS has different levels of access, check periodically to ensure that only authorized folks are gaining access to your material.

Online leaks are not the only way to compromise valuable business data. Consider these possibilities: a manager accidentally prints a lengthy, detailed memo on a shared printer—in the wrong depart-

protected area. Naming sensitive documents or E-mail something innocuous can also protect confidential information. (And because sensitive E-mail can seriously damage a company if it goes to the wrong person, consider delivering top-secret documents by hand rather than trusting them to your E-mail system.)

Another risky area can be joint files that are shared far too broadly because users simply give everyone access to a certain folder or their hard drives under AppleShare. FileMaker Pro users can easily access company databases if they are not password-protected by simply hitting Open and then clicking on the Network

button on the resulting dialog box. That shows a list of all available FileMaker Pro databases across a network. If the databases have no password, or use obvious ones, the data can be quickly accessed and changed or deleted.

Then there's the nightmare of dead files brought back to life. Confidential files that have been deleted but not overwritten on a hard drive can be recreated with any number of utility packages. That might be a serious problem if a Mac or external hard drive is sent out for repair, sold, or transferred within

an organization. Reformatting the drive or using shredding software is vital in those cases.

Fighting Back

To guard against security risks of all types, Schneier recommends that you establish appropriate countermeasures. These include creating security policies and procedures; educating users about those policies; using security hardware and software as needed; and frequently



ment. Or the manager uses a shared printer in the right department and makes sure to grab the document as it prints. But as that happens, other users can see via PrintMonitor that the LaserWriter is preparing to print John Q. Manager's "Layoff Plans." (This is a problem with LaserWriter 7.X drivers but not with version 8.0.)

Mistakes can happen when choosing a printer, but you can minimize the risk by dedicating a printer to confidential documents and keeping it in a physically

Keep the Flame Alive

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monitoring the security system to correct and update it.

If your company or department has no security system, start by analyzing the network and the information it contains. Ask yourself who has access to what and why. At the bare minimum every server, shared volume, database, ARA connection, bulletin board system, Internet connection, E-mail account, and ISDN link needs to be password-protected.

Minimal password protection is simple and user-friendly, but as Schneier points out, it's not at all secure. If you disagree, try this experiment: take an employee list and try to access your network or server by using employee names as authorized users and their first name or *guest* as the password. If you're shocked by what you find, consider more stringent security measures—from limiting network access, to adding software that lets you audit network activity, to encryption software and dial-back modems.

Protect Your Macintosh highlights the challenges and approaches of network security. To summarize:

- Every part of a network must be guarded from intruders. That includes monitoring any network links to clients, field offices, and headquarters. One corporate network manager, who asked not to be named, told me a security horror story about the service bureau his compa-

ny's publications department used for four-color film production. The publication department of Company X transmitted large graphics files via an ISDN link with the service bureau, which had similar links with its most important customers. Some of those customers were competitors of Company X; and one fine day a service bureau employee mistakenly configured the service bureau's network software so that the competitors could see one another's network zones and access information that was not protected. The moral of the story, in part, is not to entrust your fate to someone else.

- The most effective way to counter security risks is with a written policy supported by top-level management. Such a document should outline potential problems, appropriate solutions, and the responsibilities employees have in maintaining security.

- The simplest approach to protecting security is to limit dial-in access to the network, make regular backups, and change passwords regularly. Passwords should also be changed promptly upon the departure of an employee. The status of an individual's access to information changes over time; security systems are often slow to catch up.

- At a minimum, protect phone lines with password security; better yet, use dial-back modems.

- AppleTalk offers an easy way to limit user access. "Routers connect zones that you establish on the network," writes Schneier. "Implementing security measures here lets you restrict a zone of users from the rest of the network, restrict packets passing across the router, or divide the AppleTalk network into several restricted areas."

- File sharing under System 7 can be dangerous since it can allow anyone on the network to access the full system. (One sneaky network administrator I heard of installed System 7 with the File Sharing option on for all his users—without explaining the feature to them.)

For More Information

For more detailed information on security issues, contact the Computer Security Institute (415/905-2626) of San Francisco. CSI offers training, a newsletter, and conferences, including the upcoming 21st Annual Computer Security Conference scheduled for November 14 through 16 in Washington, D.C. **m**

Send nominees for sainthood to *Service Hero*, Macworld, 501 Second St., San Francisco, CA 94107, or via Internet (Branscum@AOL.com). Conversely, drop *Conspicuous Consumer* a line if a company is ignoring you.

SERVICE HERO

Rustin Ross of Northbrook, Illinois, bought Dayna Communications' SafeDeposit to perform backups locally on a network server. There are two versions of SafeDeposit; only the server version allows for any network use. "Because I wasn't going to be backing up from a remote machine, I thought the less expensive version would be fine," writes Ross, who checked the product description in a software catalog to make sure his assumption was correct.

When it turned out that he needed the server version of SafeDeposit, Dayna sent Ross, free of charge, the more expensive server version by overnight delivery. "Dayna's response was the best I've ever seen, and were it more pervasive it would translate into more business for the benevolent companies and more converts to the Mac platform."

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				<input type="checkbox"/> Own Condo/Co-op		<input type="checkbox"/> Live With Parents			
Date Of Birth (Month/Day/Year)		Mother's Maiden Name		Home Phone Number And Area Code ()			Name Home Phone Is Listed Under		
Previous Home Address, Number And Street				City Or Town		State	Zip Code	Years There	

Please Tell Us About Your Job

3

Business Name Or Employer		Position		Years At Job	Business Phone Number And Area Code ()	
Check Here If You Are: <input type="checkbox"/> Retired <input type="checkbox"/> Self-Employed		If Retired Or Self-Employed, Give Bank Name		Bank Phone Number And Area Code ()		Bank Account Number

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Other Yearly Income Sources	

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5

Please Check Those That Apply. Be Sure To Specify Bank/Institution Name.

<input type="checkbox"/> Money Market/Investment Account	Bank/Institution Name:	
<input type="checkbox"/> Checking Account	Bank/Institution Name:	
<input type="checkbox"/> Savings Account	Bank/Institution Name:	
<input type="checkbox"/> Visa/MasterCard	<input type="checkbox"/> Diners Club	<input type="checkbox"/> American Express
<input type="checkbox"/> Dept. Store/Sears	<input type="checkbox"/> Gasoline	<input type="checkbox"/> Other

Would You Like An Additional Card At No Charge?

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If Yes, Print The Name Of The Additional Cardmember (First, Middle, Last)

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7

Do You Own A Computer? <input type="checkbox"/> Apple <input type="checkbox"/> Other <input type="checkbox"/> None	Do You Use Your Computer At? (Check Those That Apply) <input type="checkbox"/> Home <input type="checkbox"/> School <input type="checkbox"/> Business
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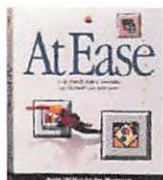
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CU-00534 (8/94)



Editors' Choice

THE BEST PRODUCTS FEATURED IN MACWORLD

Edited by Elizabeth Maffly

Macworld Editors' Choice is a complete listing of the hardware and software products selected as the best of their type in *Macworld's* comparative articles. A ♦ next to a product indicates that we chose more than one product in that category. A ○ next to a product listing indicates that a native Power Mac version is available.

Hardware

MONITORS

BLACK-AND-WHITE MONITORS, May 93

Portrait monitor: 15-Inch Gray Scale Portrait Display; Mirror Technologies, 612/633-4450; \$399, with video-display board \$549.

Two-page monitor: ♦ L-View MultiMode; Sigma Designs, 510/770-0100; \$1099, with video-display board \$1398. ♦ MD 202 Two Page Display; Mobius Technologies, 510/654-0556; \$699, with video-display board \$798.

COLOR MONITORS, Oct 93

16- and 17-inch: ♦ ErgoView 17; Sigma Designs, 510/770-0100; \$1349. ♦ MultiSync 5FG; NEC Technologies, 708/860-9500; \$1355 (NEC's estimated dealer price).

SMALL COLOR MONITORS, Jan 94

14-inch display: ♦ Sony CPD 1430; Sony Corp. of America, 800/222-7669; \$779.95. ♦ Nanao FlexScan F340iW; Nanao USA, 800/800-5202; \$799.

15-inch display: NEC MultiSync 4FG; NEC Technologies, 708/860-9500; estimated street price \$755.

NETWORK HARDWARE

HIGH-SPEED FAX MODEMS, Oct 93

Teleport Gold and Silver with Global Fax; Global Village Communication, 415/390-8200; Gold \$499, Silver \$429.

REMOTE-ACCESS SERVERS, Oct 94

Mixed networks: NetConnect Remote Access Server; Asanté Technologies, 408/435-8401; \$3899 for eight ports.
AppleTalk networks: ARA Multiport Server; Apple Computer, 408/996-1010; four ports \$1799, eight ports \$3298.

PRINTERS

COLOR PRINTERS, Aug 94

Low-end ink-jet: DeskWriter 560C; Hewlett-Packard, 800/752-0900; \$719.

Solid ink-jet: Phaser 300i; Tektronix, 503/682-7377;

\$9995.

Thermal-wax transfer and color laser: Phaser 220i; Tektronix, 503/682-7377; \$5995.

DYE-SUBLIMATION PRINTERS, Jul 94

Prepress proofing—tabloid size/fastest: Phaser 480; Tektronix, 503/682-7377; \$14,995.

Prepress proofing—tabloid size/most complete: Rainbow; 3M, 612/733-1110; estimated street price of \$20,000.

Prepress proofing—letter size: ProofPositive Full Page; SuperMac Technology, 408/541-6100; \$7999.

General publishing and business: Phaser IISDX; Tektronix, 503/682-7377; \$9995.

PERSONAL PRINTERS, Sep 94

Ink-Jet: DeskWriter 520; Hewlett-Packard, 800/752-0900; \$365.

Laser—\$1000 to \$1600: microLaser Pro 600; Texas Instruments, 214/995-6611; \$1599.

WORKGROUP PRINTERS, Feb 94

High-speed: Hewlett-Packard 45i MX; Hewlett-Packard, 800/752-0900; \$5499.

Best buy: ♦ Apple LaserWriter Pro 630; Apple Computer, 408/996-1010; \$2529.

♦ Hewlett-Packard LaserJet 4M; Hewlett-Packard, 800/752-0900; \$2329.

SCANNERS/IMAGE CAPTURE

ELECTRONIC CAMERAS, Sep 94

Apple QuickTake 100; Apple Computer, 408/996-1010; \$749.

LOW-COST COLOR SCANNERS, Nov 93

\$1300 to \$1600: ♦ La Cie Silverscanner II; La Cie, 503/520-9000; \$1599. ♦ Hewlett-Packard ScanJet IIc; Hewlett-Packard, 800/752-0900; \$1599.

Under \$1300: Mirror 800 Plus Color Scanner; Mirror Technologies, 612/633-4550; \$1299.

OCR, Nov 93

OmniPage Professional; Caere Corp., 408/395-7000; \$995.

SYSTEMS/STORAGE

DOUBLE-SPEED CD-ROM DRIVES, Jul 93

Sheer speed: Pioneer DRM-604X; Pioneer, 800/444-6784; \$1495.

Overall value: AppleCD 300; Apple Computer, 408/996-1010; \$599.

Budget choice: NEC MultiSpin 38; NEC Technologies, 708/860-9500; \$465.

HIGH-SPEED HARD DRIVES, Aug 93

2.7GB drives: ♦ Nova XL 2700; Microtech International, 203/468-6223; \$2999. ♦ Vista 3.5GB; Relax Technology, 510/471-6112; \$3499.

SCSI-2 adapter: QuickSCSI; PLI, 800/288-8754; \$499.

MACINTOSH UPGRADES, Jun 93

SE accelerator (25MHz): Quik30; Novy Systems, 904/427-2358; \$449 (without FPU).

SE/30 accelerator (50MHz or 33MHz): Universal PowerCache; DayStar Digital, 404/967-2077; 50MHz \$999 (with FPU), 33MHz \$449 (without FPU).

LC and LC II upgrades: Macintosh LC III Logic Board Upgrade; Apple Computer, 408/996-1010; \$599.

Mac II accelerators: ♦ Radius Rocket 25i; Radius Rocket 33; Radius, 408/434-1010; 25i \$1199, 33 \$2499.

♦ Universal PowerCache series; DayStar Digital, 404/967-2077; \$449 to \$999.

Ilfx SCSI accelerator: QuickSCSI; PLI, 800/288-8754; \$499.

Quadra static-RAM cache card: FastCache Quadra; DayStar Digital, 404/967-2077; \$299 for Quadra 700 and 900, \$449 for Quadra 800 and 950.

OPTICAL DRIVES, Dec 93

3½-inch: ♦ Epson OMD 5010; ClubMac, 800/258-2622; \$959.

♦ 128 MO; APS Technologies, 800/874-1428; \$899.

5¼-inch: ♦ Sharp JY-750; ClubMac, 800/258-2622; \$1829.

♦ Infinity MaxOptical 11m; Peripheral Land Inc., 800/288-8754; \$4113.

PC COPROCESSING, Oct 94

OrangePC Model 210; Orange Micro, 714/779-2772; \$1283.

VIDEO/DISPLAY

24-BIT VIDEO CARDS, Apr 94

Inexpensive acceleration: PrecisionColorPro 24XP; Radius, 408/434-1010; \$599.

Full-featured acceleration: Thunder II GX-1360; SuperMac Technology, 408/541-6100; \$4499.

HIGH-END VIDEO EDITING, Jun 94

Presentation video: ♦ MoviePak2 Pro Suite; RasterOps, 801/785-5750; \$4199. ♦ VideoVision Studio; Radius, 408/434-1010; \$4499.

Corporate video (offline): Media Composer 400s; Avid Technology, 508/640-6789; \$14,995.

Corporate video (online): VideoCube; ImMix, 916/272-9800; \$40,500.

continues

Editors' Choice

PHOTOSHOP ACCELERATORS, Apr 94
PhotoBooster; Radius, 408/434-1010; \$999.

Software

ACCOUNTING/FINANCE

GROWING A SMALL BUSINESS, Nov 93
Small-business system: M.Y.O.B.; Teleware, 201/586-2200; \$199.
Home office/personal finance: MacMoney; Survivor Software, 310/410-9527; \$119.95.

BUSINESS TOOLS

STATISTICS, Oct 93
Exploratory data analysis: DataDesk 4.1; Data Description, 607/257-1000; \$595.
Comprehensive package: SYSTAT 5.2.1; SYSTAT, 708/864-5670; \$895.

CD-ROM

TOP 10 CD-ROMS, Mar 94
Overall: Seven Days in August; Time Warner Interactive Group, 818/955-9999; \$79.99.

COMMUNICATIONS/NETWORKS

COMMUNICATIONS SOFTWARE, Aug 94
Basic connectivity: ZTerm; David P. Alverson (no phone number available); \$30.
Terminal emulation: Crosstalk for Macintosh; Digital Communications Associates, 404/442-4000; \$195.
Internet exploration: VersaTerm; Synergy Software, 215/779-0522; \$125.

DOS WINDOWS EMULATION, Oct 94
Timbuktu Pro 1.0.3 for Macintosh, Timbuktu 1.1 for Windows; Farallon Computing, 510/814-5000; \$199 each.

HIGH-SPEED FAX MODEM SOFTWARE, Oct 93
Faxstf; Telefocus, 816/886-9800; \$79.

NETWARE CONNECTIVITY, Sep 93
NetWare for Macintosh; Novell, 801/429-7000; \$495 for 5-user license to \$2295 for 200-user license.

PROTOCOL ANALYZERS, Jul 94
EtherPeek, AG Group, 510/937-7900; \$795.

SOFTWARE ROUTER, Jul 93
Apple Internet Router 3.0; Apple Computer, 408/996-1010; Basic Connectivity Package \$499.

TERMINAL EMULATOR, Oct 93
VersaTerm; Synergy Software, 215/779-0522; \$149.

GRAPHICS

3-D DESIGN, Aug 93
Price for performance: ♦ Ray Dream Designer 2.0.4;

Ray Dream, 415/960-0765; \$299. ♦ Alias Sketch 1.5; Alias Research, 416/362-9181; \$995.

All-in-one solution: ♦ Infini-D 2.5; Specular International, 413/253-3100; \$695. ♦ StrataVision 3D 2.6.1; Strata, 801/628-5218; \$995.

CLIP ART'S GREATEST HITS

Overall collection: ♦ ClickArt Studio Series; T/Maker Company, 415/962-0195; \$99.95 per volume. ♦ Electronic Clipper subscription service; Dynamic Graphics, 800/255-8800; \$67.50 per month. ♦ Metro ImageBase Electronic Clip Art; Metro ImageBase, 800/525-1552; \$74.95 per volume, CD-ROM \$149.95. ♦ Images with Impact series; 3G Graphics, 800/456-0234; \$99.95 to \$129.95 per volume, CD-ROM \$499. ♦ Typographers' Ornaments; Underground Grammarian, 609/589-6477; \$25 per volume; ten TIFF albums \$200; EPS volumes \$50 each.

DRAW PROGRAMS (LOW-COST)

Budget draw: Expert Draw; Expert Software, 305/567-9990; \$49.95.
Budget draw/paint: UltraPaint; Deneba Software, 305/596-5644; \$79.
Beginners' program: Aldus SuperPaint; Aldus Corp., 619/558-6000; \$149.95.
Overall: Canvas; Deneba Software, 305/596-5644; \$399.

FONT BUYERS' GUIDE

Text-face collection: Type On Call CD-ROM; Adobe Systems, 415/961-4400, 800/682-3623; \$99 (includes the ability to unlock two families from preselected packages) plus \$25 to unlock individual faces or \$69 to \$179 for unlocking families.
Display/decorative-face collection: Fontek; Letra-set, 201/845-6100; \$39.95 per face.
Bargain collection: Monotype ValuePack; Monotype, 312/855-1440; \$89 for 57 fonts.

IMAGE DATABASES

♦ Aldus Fetch 1.0; Aldus Corp., 206/628-5739; \$295.
♦ Multi-Ad Search 2.0; Multi-Ad Services, 309/692-1530; \$249.

PAINT AND IMAGE-EDITING

Budget buy: Expert Color Paint; Expert Software, 305/567-9990; \$49.95.
Overall program: Fractal Design Painter; Fractal Design Corp., 408/688-8800; \$399. ♦
Image-editing program: Adobe Photoshop 2.5.1; Adobe Systems, 415/961-4400; \$895.

INTEGRATED SOFTWARE

INTEGRATED SOFTWARE, Feb 94
ClarisWorks; Claris Corporation, 408/727-8227; \$299. ♦

Vendors: Please write to *Macworld Editors' Choice*, 501 Second St., San Francisco, CA 94107, or send a fax to 415/442-0766 to inform us of changes in your phone number or your product's list price.

ONLINE SERVICES

ONLINE SERVICES, Aug 94
E-mail: America Online; America Online, 703/893-6288; basic monthly fee \$9.95.
Reference: CompuServe; CompuServe Information Service, 614/457-0802; basic monthly fee \$8.95.

ORGANIZATION/PRODUCTIVITY

CALENDARS, Jul 93
Alarm system: ♦ First Things First; Visionary Software, 503/246-6200; \$79.95.
♦ Smart Alarms Plus; JAM Software, 203/630-0055; \$75.
All-around scheduler: Now Up-to-Date; Now Software, 503/274-2800; \$99.
Meeting scheduler: Meeting Maker; On Technology, 617/374-1400; five-pack \$495.

GRAPHING SOFTWARE, Aug 94
DeltaGraph Pro 3 3.0.4; DeltaPoint, 408/648-4000; \$195. ♦

SALES-AUTOMATION SOFTWARE, Oct 93
♦ Contact Ease; WestWare, 619/274-5053; one user \$395, five users \$1495. ♦ CBS; Colleague Business Software, 512/345-9964; \$495.

TEXT-RETRIEVAL SOFTWARE, Dec 93
Small system: On Location; On Technology, 617/374-1400; \$129.
Multiuser system: Personal Librarian; Personal Library Software, 301/990-1155; \$995.

PRESENTATION TOOLS

PRESENTATION SOFTWARE, Jul 94
Persuasion 3.0; Aldus Corp., 206/622-5500; \$495.

UTILITIES

BRAVE NEW DOCUMENTS, Jan 94
Application-independent document distribution: Common Ground; No Hands Software, 800/598-3821; \$189.95.
Book-length documents: FrameReader; Frame Technology, 800/843-7263; \$84.95.

PRINTING, Sep 93
PC-printer cable packages: PowerPrint; GDT Softworks, 604/291-9121; \$149.

VIRUS KILLERS, Jul 94
Commercial software: Virex; Datawatch, 919/549-0711; \$99.95.
Free software: Disinfectant; free from online services.

VIRTUAL MEMORY SOFTWARE

VIRTUAL MEMORY, Jun 94
Virtual memory software: Virtual 3.0; Connectix Corp., 415/571-5100; \$99.
Memory-boosting software: RAM Doubler 1.0.1; Connectix Corp., 415/571-5100; \$99. **m**

Star Ratings

OVER 300 HARDWARE AND SOFTWARE REVIEWS AT A GLANCE

Edited by Wendy Sharp

Macworld Star Ratings lets you compare hardware and software products for the Macintosh by providing summaries of *Macworld's* authoritative product reviews from the past year. The number of stars at the beginning of each capsule review indicates quality; our reviewers assign five stars to outstanding products and one star to poor ones. The  symbol indicates that a product is available in a native PowerMac version, although unless stated otherwise the version we reviewed was the 680X0 version.

If a product has been upgraded since our last review, the most recent version number supplied by the vendor appears in parentheses after the reviewed version number. To read a full review of any product in the listing, please consult the issue listed at the end of each synopsis.

Vendors: Please write to *Macworld Star Ratings*, 501 Second St., San Francisco, CA 94107 to inform us of changes in the version number or list price of your product, or of changes to your phone number.

Software

BUSINESS TOOLS

★★★★ **4D First 1.0**, ACI US, 408/252-4444, \$295. This entry-level relational database is a low-cost way to distribute the power of 4D and 4D Server to an office full of Macs. It's not much easier to use, however, than the full-fledged 4D. May 94


★★★★ **AccuZip6 1.8.7**, Software Publishers, 800/233-0555, \$689. Bulk-mail software has informative progress indicators, batch and individual processing, low rates, and flexible parsing during import, but the interface is incomprehensible. Sep 94

★★★★ **Acrobat Exchange, Acrobat Distiller**, Adobe Systems, 415/961-4400, \$195 to \$2495. Complete, well-planned paperless office system creates application-independent viewable files that can be readily distributed on a network. Still, it's not yet as inexpensive or as convenient as you might wish. Oct 93

★★ **BaseMap 1.0.1**, GeoPoint, 415/957-1560, \$149. For simple maps displaying simple data, this map-making tool may be useful. It's not for the cartographic sophisticate, however, as it offers very limited data-display abilities and only one projection. May 94


★★ **Bulk Mailer CASS 1.00d**, Satori Software, 206/443-0765, \$150. Unattended operation is possible with this inexpensive bulk-mail software, but batch processing is slow and the program has coding problems. Sep 94

★★★★ **ClarisImpact 1.0**, Claris Corp., 408/727-8227, \$399. Business graphing, project manage-

ment, object-oriented drawing, word processing, and presentation functions merge in this business graphics software. The outstanding integration offers versatility that dedicated programs are pressed to match. Jun 94 

★★★★ **Common Ground 1.0, No Hands Software**, 415/802-5800, \$189.95. Simple, robust document-interchange system is the clear choice for modest document-distribution jobs. In tests, it worked easily with documents from many different applications. Oct 93

★★★ **Cricket Graph III 1.5**, Computer Associates International, 516/342-6000, \$129. Basic and foolproof charting program produces cleaner charts than Excel with little effort, although its feature set is fairly modest. Apr 94

★★★★ **DeltaGraph Pro 3 (3.5)**, DeltaPoint, 408/648-4000, \$195. At its new lower price, this charting program is the best feature-for-feature value in Macintosh charting. There's even a new Chart Advisor function that suggests the appropriate display for your data. Apr 94 

★★★ **FastTrack Schedule 2.1**, AEC Software, 703/450-1980, \$279. Simple project-management software is ideal for managers who need to put together a schedule quickly and easily, but if you require more power to manage conflicts between multiple projects and resource allocation, you'll need a more comprehensive program. Sep 94

★★★★ **Helix Express 2.0.1**, Helix Technologies, 708/465-0242, \$589. Icon-based relational-database software's improved performance makes it a serious competitor for all-Mac networks. Especially notable is its much faster speed; multiuser operation is downright snappy. Jul 94

★★★ **Helix Tracker 1.0**, Helix Technologies, 708/465-0242, \$439. Well-designed workgroup-document manager has strong audit and annotation features; imposes just the right amount of administrative discipline. For large documents, however, Ethernet will look mighty attractive. Nov 93

★★ **Lotus Notes 3.0**, Lotus Development Corp., 617/577-8500, \$495 per client. Well-organized, robust, and flexible business data system demands a full-time administrator, preferably with considerable programming experience, for effective use. Sep 93

★★★★ **Map II 1.5**, ThinkSpace, 519/661-4006, \$395. Well-structured program has most of the functions a simple geographical information system needs and is suitable for introductory instruction in GIS and for alert first-time users who just like maps. May 94

★★★★ **Market Master Manager 3.5**, Breakthrough Productions, 916/265-0911, \$395 to \$1995. Sales-automation software is designed to keep track of contacts, generate mailings, and make sure that leads don't fall through the cracks. It includes a remote module,

but it has some odd user-interface features. Oct 93

★★★ **Micro Planner Manager 1.1**, Micro Planning International, 303/757-2216, \$695. When you require cross-project resource sharing and leveling for a reasonable price, this project-management software has the edge. It has a generally intuitive interface, though there's a steep learning curve for its advanced features. Nov 93

★★★★ **Microsoft FoxPro for Macintosh 2.5**, Microsoft Corp., 206/882-8080, \$495. Dazzlingly fast and easy to use relational database has a greatly improved interface and cross-platform compatibility. For projects of 4 to 20 users that handle large amounts of data (hundreds of thousands to millions of records) it offers excellent performance. Apr 94

★★★ **Office Tracker 1.1**, Milum Corp., 512/327-2255, \$195 to \$995. The efficient user interface of this software sign-out board, in both single-user and networkable versions, makes it easy to learn and use; but it has some minor flaws. Dec 93

★★★★ **Pablo 2.0.1**, Andyne Computing, 613/548-4355, \$695. Database-reporting tool is one of the most effective end-user data-reporting tools yet evolved. It puts a considerable workload on the corporate information department, but it sidesteps the hassles of SQL data access and produces great reports with minimal effort. Jul 94

★★★★ **TopDown 4.0**, Kaetron Software Corp., 713/298-1500, \$345. Flowcharting program's support for custom symbols, multiple palettes, and automatic drawing aids, along with its ability to let you easily create and navigate lower-level charts, make it a productive tool. Jul 94

★★ **Useful Voice Processor for Macintosh 1.1v7 (1.1v9)**, Useful Software Corp., 508/774-8233, \$179.95. Dictation software lets you record and transcribe on a Mac. It has some useful features, but you must take uncommon care to avoid crashes. Dec 93

★★★★ **ZP4 12.1**, Semaphore Corp., 408/688-9200, \$125. Inexpensive bulk-mail software supports batch and individual processing, but the progress indicators are uninformative, and unattended operation requires extra work. Sep 94

COMMUNICATIONS/NETWORKS

★★ **AccessPC 3.0**, Insignia Solutions, 415/694-7600, \$129.95. Utility translates most word-processor and some database formats, but it doesn't translate graphics and some of its translations result in data loss. Apr 94

★★★★ **Crosstalk for Macintosh 2.0**, Digital Communications Associates, 404/442-4000, \$195. Commendable communications product has a feature set that well matches its competition. Still, the script *continues*

Star Ratings

editing is complex and you must manually enter phone numbers each time you use it. **Apr 94**

★★★★ **Delrina FaxPro for Macintosh 1.0**, Delrina Corp., 408/363-2345, \$129. Fast, efficient fax software has an excellent address-book feature but also has some interface quirks and minor bugs. **Feb 94**

★★★★ **DOS Mounter Plus 4.0**, Dayna Communications, 801/269-7200, \$100. File-transfer and translation utility works with floppies, removable drives, and network volumes and supports wild cards in DOS extensions. **Apr 94**

★★★★ **EtherPeek 2.0.3**, LocalPeek 2.0.3, TokenPeek 1.0 (2.0.3), AG Group, 510/937-7900, \$495 to \$995. Priced at a fraction of the cost of dedicated hardware analyzers, these network analyzer tools give you better analysis with a friendlier interface. They're a worthwhile investment. **Jan 94**

★★★★ **MacLink Plus/Translators Pro 7.5**, DataViz, 203/268-0030, \$149. If your PC files are in archaic formats, you'll need this file-transfer and translation utility. It's a great option for most users, but it doesn't support removable drives or network volumes. **Apr 94**

★★★★ **On The Road 1.1**, Connectix, 415/571-5100, \$99. Helpful PowerBook utility looks at what's hooked up to your computer and adjusts accordingly—for example, printing when a printer is available and otherwise deferring printing. It only supports some hardware, however, so check before buying. **Dec 93**

★ **PowerShare Collaboration Servers**, Apple Computer, 408/996-1010, \$999. Before this collaboration software will be ready for prime time, Apple needs to overhaul the complex Admin application, add serious diagnostic aids, provide comprehensive documentation, and offer knowledgeable technical support at a price less than that of the program itself. **Aug 94**

★★★★ **Silver Cloud 1.2**, AG Group, 510/937-7900, \$495. If you are administering a large network and are drowning in a sea of devices and zones, this network-management software will make your life simpler. **Feb 94**

★★★★ **SITcomm 1.0**, Aladdin Systems, 408/761-6200, \$120. Inexpensive telecommunications software is fairly easy to set up and use, and will do well for people who use just one or two online services. Still, it lacks true scripting and has limited protocol options. **Apr 94**

★★★★ **Snap Mail 1.01**, Casady & Greene, 408/484-9228, \$200 to \$1440. Software will put you on the electronic-mail trail more easily and more cheaply than any competing product, if you can live with some minor (but surprising) shortcomings. **Jun 94**

★★ **SoftPC 3.1**, Insignia Solutions, 415/694-7600, \$499. While the speed of this Windows PC emulator is greatly improved, buying an add-in PC card for your Mac is more efficient. **Mar 94**

★★ **SoftWindows 1.0**, Insignia Solutions, 415/694-7600, \$499. You can run Windows software on a Mac with this emulation software, but although it's a viable solution, you pay the price in terms of performance, compatibility, and actual cost. **Aug 94**

★★★★ **Timbuktu Pro**, Farallon Computing, 510/814-5000, \$199 to \$1999. Terminal emulation product is a must-have for in-house technical-support staff and for people who need direct connection to computer systems on a variety of networks. The major enhancements of this version are TCP/IP support for Macs and noticeably faster screen redraw. **May 94**

★★ **TrafficWatch II 2.0**, Neon Software, 510/283-9771, \$495. The price of this AppleTalk traffic monitor is closer to that of full-blown network analyzers

that do much more, albeit with greater complexity. Without printing, alarms, triggers, or true multiprotocol support, this product misses the mark. **Jun 94**

★★★★ **VersaTerm 5.0**, Synergy Software, 215/779-0522, \$195. The price and feature set of this network terminal-emulation package make it a terrific value, in spite of its complex documentation and limitations. If you're looking for a fast path to Internet connectivity, this is it. **Jan 94**

DESKTOP PUBLISHING

★ **AboutFace 1.1.1 (1.1.2)**, Big Rock Software, 716/288-2860, \$69.95. Type-specimen generator has many serious deficiencies that need to be addressed. **Jan 94**

★★★★ **Aldus PageMaker 5.0**, Aldus Corp., 206/622-5500, \$895. Desktop publishing software has added the features, both great and small, that it's been lacking, while still retaining the ease-of-use advantages that it's always had. This is a superb upgrade. **Nov 93**

★★★★ **FontChameleon 1.0.1**, Ares Software Corp., 415/578-9090, \$295. Font utility introduces a new font-creation technology; it builds serif and sans serif fonts from a master outline file. It offers high-quality renditions of popular fonts, plus the ability to customize fonts. **Sep 94**

★★★★ **FontMonger 1.5.7**, Ares Software Corp., 415/578-9090, \$149.95. Font-conversion utility provides cross-platform, cross-font conversion and makes it easy to create composite, subscript, superscript, and rotated characters. **Sep 93**

★★ **FotoTune 1.1**, Agfa Division of Miles, 508/658-5600, \$795. Color-management software has a capable engine, but it's not the complete color management system Agfa touts. Invisible tech support and poor documentation were only part of the problem. **Apr 94**

★★★★ **FrameMaker 4.0**, Frame Technology Corp., 408/433-3311, \$895. For such projects as long, structured documents—books, instruction manuals, and textbooks—this desktop publishing program is one of the best tools available. It's fast, well mannered, and a real time-saver. **Mar 94**

★★★★ **Kodak ColorSense 1.0**, Eastman Kodak, 716/253-0740, \$499. Color-management system gives average users access to a reasonable level of color consistency at a reasonable price. It does not make color separations. **Oct 93**

★★★★ **Print Shop Deluxe**, Broderbund Software, 415/382-4400, \$50. Even the most ham-fingered can create professional-looking greeting cards, signs, banners, letterhead stationery and calendars with these desktop publishing templates and graphics. While it's not a substitute for a high-end program, it is easy to use and inexpensive. **Apr 94**

★★★★ **QuarkXPress 3.2**, Quark, 303/894-8888, \$895. This upgrade adds the EfiColor XTension to ensure the greatest possible fidelity of color images and is a must-have for professional color publishers who use Quark. For others, the enhancements are welcome but minor enough that they provide little incentive to upgrade. **Nov 93**

★★★★ **Tableworks Plus 1.05**, Npath, 206/392-7745, \$299. Publishing utility adds a full table-editor to QuarkXPress and is a must-have for anyone doing even mildly complex tables. **Jan 94**

EDUCATION

★★★★ **Creative Writer 1.0**, Microsoft Corp., 206/882-8080, \$64.95. Graphics/page-layout/word-

processor hybrid offers some terrific type effects, zany sounds, bright graphics, and wacky characters. While it doesn't teach kids to be better writers, it does encourage them to develop ideas and provides a fun vehicle to express those ideas creatively. **Sep 94**

★★★★ **The Cruncher**, Davidson & Associates, 310/793-0600, \$59.95. If you want to teach a child spreadsheet basics, this combination educational spreadsheet and business application will do the job. It's creative and easy to use, but slow. **Aug 94**

★★★★ **Grolier Multimedia Encyclopedia**, Grolier Electronic Publishing, 203/797-3530, \$395. CD-ROM encyclopedia has excellent search capabilities, weighs much less than a shelf of books, and is lots of fun. Its timeliness and some hierarchical snafus were slight problems. **Jul 94**

★★★★ **How Computers Work**, Time Warner Interactive Group, 818/955-9999, \$79.99. Graceful, well-integrated CD-ROM tutorial guides the curious through brief but helpful explanations of basic computer technologies. **Jan 94**

★★★★ **HyperStudio**, Roger Wagner Publishing, 619/442-0522, \$179.95. Hypermedia authoring tool supports color and many multimedia functions through easy-to-use dialog boxes, but the interface doesn't always follow Apple guidelines. **Dec 93**

★★★★ **MacGrade 1.5.5**, CalEd Software, 800/795-0641, \$85 to \$245. Grade-book program has a straightforward, simple interface and clear documentation. Although there's room for improvement, it's easy to use and flexible. **Feb 94**

★★★★ **The Rosetta Stone**, Fairfield Language Technologies, 703/432-6166, \$395. Foreign-language instruction on CD-ROM is a valuable educational tool and fun to use. The lessons are well paced, and the content is generally excellent and diverse. **Jan 94**

★★★★ **Small Blue Planet 1.2.1**, Now What Software, 415/885-1689, \$79.95. Nicely integrated collection of beautiful Earth-from-space images on CD-ROM lacks many features of standard atlases and doesn't have a search function, but is endlessly fascinating. **Jul 94**

ENTERTAINMENT

★★★★ **BlackJack Trainer**, ConJelCo, 412/492-9210, \$75. Learn the strategies you need to win at blackjack with this program. There are a number of trivial bugs, but they won't get in the way. **Oct 93**

★★★★ **Crystal Crazy**, Casady & Greene, 408/484-9228, \$49.95. Ultraglossy, superpolished version of the classic Crystal Quest is both challenging and fun without being overly difficult. Each level retains some old elements, and adds some new ones to keep you on your toes. **Jun 94**

★★★★ **Daily Sports Quiz 1.0**, DreamTime, 619/236-1341, \$49.95. If you think you know a lot about sports and love to play trivia games, then this entertaining and informative game is for you. **Oct 93**

★★★★ **Falcon MC 1.0**, Spectrum HoloByte, 510/522-1164, \$69.95. Whether you're an armchair jet jockey or an experienced fighter pilot, you're bound to be impressed by the 4-bit color, enhanced graphics, and sophistication of this latest incarnation of the original Macintosh combat flight simulator. **Dec 93**

★★★★ **Firefall Arcade**, Inline Software, 203/435-4995, \$49.95. If you loved the classic video game Centipede, or are just looking for a fun shoot-'em-up, this arcade-style game will satisfy. **Jun 94**

★★★★ **Hell Cab 1.0.1**, Time Warner Interac-

tive Group, 818/955-9999, \$99.99. Take a diabolical New York cabbie with a penchant for time travel, toss in the Empire State Building, add a few brainteasers, and you've got this engaging game on CD-ROM. It's slow and the arcade sections are hard to control, but overall it succeeds. Jan 94

★★★★ **Indiana Jones and the Fate of Atlantis, LucasArts Games, 415/721-3394, \$59.95.** In this game, the whip-wielding archaeologist goes looking for Atlantis and finds it armed to the gills with magical technology and Nazi stooges. If you're not bothered by the story's astonishing sexism, you'll find it diverting. Oct 93

★★★★ **The Journeyman Project 1.0 (1.2), Presto Studios, 619/689-4895, \$79.95.** Interactive science-fiction epic on CD-ROM is a work of art. The scenes are rich with painstakingly detailed graphics, elaborate models, and subtle textures, but the sluggish pace may leave you impatient and bored. Sep 93

★★★★ **Myst 1.0, Broderbund Software, 415/382-4400, \$59.95.** The smooth pacing of actions and sounds in this beautiful CD-ROM game give it a dreamlike quality. This is a game that's been polished until it shines. Mar 94

★★★★ **Seven Days in August, Time Warner Interactive Group, 818/955-9999, \$59.99.** Compelling, interactive documentary on CD-ROM cuts a slice from history and offers August 10 through August 16, 1961 (the building of the Berlin Wall), to viewers in a way that truly evokes the period. Oct 93

★★★★ **SimCity 2000, Maxis Software, 510/254-9700, \$69.95.** In essence, your goal with this marvelous city-simulation software is to build a city and run it successfully. The game is fascinatingly complex, but it's simple to use, and the elaborate graphics are so lovely that it's even fun just to watch. Jun 94

★★★★ **Spectre Supreme, Velocity Development, 415/274-8840, \$69.95 to \$89.95.** The pleasure of this game comes not in high scores, but in the almost addictive sense of control you get from moving your tank around the screen. It's so much fun that it's even fun when you lose. Dec 93

★★★★ **Spin Doctor, Callisto Corp., 508/655-0707, \$59.95.** In the tradition of the best Macintosh games, this game tests your wits and reflexes alike. It's part strategy game, part kinetic sculpture. Jun 94

★★★★ **V for Victory: Utah Beach, Three-Sixty Pacific, 408/879-9144, ext. 23, \$69.95.** The post-D-Day conquest of Normandy is re-created in this game; its strength is the way it blends easy play with complicated strategy. Some bugs exist. Oct 93

FINANCE/ACCOUNTING

★★★★ **Andrew Tobias' TaxCut 1993, MECA Software, 203/255-1441, \$79.95.** The free-form approach and flexible Help menus of this tax-preparation software make filling out your tax return a smooth, almost relaxing process. The only state versions available are California and New York. Apr 94

★★★★ **ExpensePlus 1.0.1, State of the Art, 714/753-1222, \$139.95 to \$159.95.** Software uses a Newton MessagePad to record expenses, then sends the data to a Mac to create and print expense reports. While it's a real time-saver, you'll need AppleScript expertise to modify the expense reports. Apr 94

★★ **Financial Competence 1.5, Competence Software, 603/435-5098, \$99.** Business economics tutorial explains how financial statements are compiled and how they relate to each other, but you could learn the same

things from a book, faster and for less money. And that might be the more financially competent thing to do. Jul 94

★★★★ **MacInTax 1993, ChipSoft, 602/295-3110, \$69.95.** Tax-preparation software provides a reasonably detailed manual and a reliable, structured interface for building your tax return. Its inability to accept figures containing amounts in cents or round off to whole dollar amounts will frustrate some users. Apr 94

★★★★ **MacInTax Tax Planner, ChipSoft, 602/295-3110, \$19.95.** Software allows you to construct a five-year forecast of your tax liability, projecting tax figures through 1997 in a concise summary format. If you have a tax preparation program, you can do the same thing by creating alternative tax returns. Apr 94

★★★★ **MacInTax Tax Savings Guide, ChipSoft, 602/295-3110, \$19.95.** Simple, straightforward collection of well-written, fully indexed tax tips and suggestions is designed to help you better understand your tax return and reduce your tax liability. Although strong in content, it doesn't allow you to copy and paste, export as a text file, or even print. Apr 94

★★★★ **MacMoney 4.01, Survivor Software, 310/410-9527, \$89.95.** Personal-finance software has new and improved features that will please longtime users, but it hasn't kept up with the leaders in the field and won't win many new converts. Jul 94

★★★★ **Managing Your Money 6.0, Meca Software, 800/820-7457, \$79.95.** Personal-finance program does a good job of somewhat roundabout job of keeping track of your total financial picture. Although it isn't as easy to use as the competition, it excels in tax, investment, and financial planning. Jun 94

★★★★ **Quicken 4, Intuit, 415/858-6095, \$69.95.** Personal-finance software is powerful and easy to learn, even for a financial neophyte. Although slower than previous versions, 4.0 lives up to its promise of making financial chores easier and better organized. Nov 93

GRAPHICS

★★★★ **Adobe Illustrator 5.5, Adobe Systems, 415/961-4100, \$595.** Despite slight speed disappointments, this draw program's upgrade is a bargain. It includes more than 200 tile patterns, 220 fonts, and the Acrobat Distiller and Exchange utilities. Sep 94

★★★★ **Aldus FreeHand 4.0, Aldus Corp., 206/622-5500, \$595.** The new page-design and text-editing functions of this powerful draw program make it more than worth the price of admission. Aside from some bewildering interface elements, it's an outstanding program. Mar 94

★★ **BrushStrokes 1.0, Claris Clear Choice, 408/727-8227, \$139.** If you have absolutely no experience with computer graphics, the simplified interface of this 24-bit paint program might warrant its price. Otherwise, you can find better programs for less. Oct 93

★★★★ **CA-Cricket Draw III 2.0 (2.01), Computer Associates International, 516/342-5224, \$249.** This draw program is not going to inspire experienced Mac artists to jump up and down, but its features are abundant, the interface is straightforward, and the price is right. Oct 93

★★★★ **Canvas 3.5, Deneba Software, 305/596-5644, \$399.** Draw program offers two to three times as many features as any competing program, but our reviewer would prefer an interface that you can navigate without scrambling for the manual. Jan 94

★★★★ **Collage 1.0.1, Specular International, 413/253-3100, \$349.** Image-compositing software is

a flawed but serviceable tool that allows you to combine and composite multiple RGB images stored in PICT, TIFF, and Photoshop 2.5 formats. While it's functional and indisputably easy to use, its oversights, including slow screen redraw with no interrupt option, are nearly as numerous as its benefits. Jul 94

★★ **ColorUp 1.0, Pantone, 201/935-5500, \$99.95.** Professional graphic designers don't need the advice of this color tutorial and series of palettes. Although nonprofessionals might benefit from the information on color theory, it may not be worth the money. Nov 93

★★★★ **DeBabelizer 1.5 (1.5.5), Equilibrium Technologies, 415/332-4343, \$299.** Bitmapped-graphics-conversion software supports a huge number of file formats and can work wonders. If you spend any significant time dealing with file conversion, you should have this program. Nov 93

★★★★ **DeBabelizer Lite 1.0, Equilibrium Technologies, 415/332-4343, \$129.** Terrific graphics utility converts graphics files from one format to another. It offers a choice selection of capabilities at a nice, slim price. Aug 94

★★★★ **DesignWorkshop 1.0 (1.1), Artifice, 503/345-7421, \$895.** The accessible interface and versatile modeling environment of this 3-D modeling software may be worth the fairly high price, particularly for architectural-design conceptualization. May 94

★★★★ **Infini-D 2.5.1, Specular International, 413/253-3100, \$695.** Serviceable 3-D graphics program has a wide range of modeling, rendering, and animation options, with a straightforward interface and quick operating speed. Feb 94

★★★★ **IntelliDraw 2.0, Aldus Consumer Division, 619/558-6000, \$129.** Wonderful general-purpose graphics package works well, does a great job of automating drawing tasks, and is straightforward. Despite its breadth of features, it always feels approachable. Sep 94

★★★★ **Kai's Power Tools 2.0a, HSC Software, 310/392-8441, \$199.** Phenomenally powerful suite of Photoshop plug-ins have an addictive quality typically associated with arcade games. There's no end to the automated effects you can generate, the ways you can apply them, and the artwork you can create. May 94

★★★★ **Koyn Fractal Studio 2.02, Koyn Software, 314/878-9125, \$149.95.** Software lets you generate beautiful fractals of your own design. It's a reasonable choice if you are interested in Sierpinski triangles or naturalistic forms, but it's not an all-fractals-for-all-people program. Aug 94

★★★★ **MacroModel, Macromedia, 415/252-2000, \$1495.** This 3-D modeling software is a solid resource to have along when you venture out into 3-D space. The interface is elegantly simple, making the Mac's inner space a more pleasant place to work. May 94

★★★★ **MetaFlo, The VALIS Group, 415/435-5404, \$595.** Graphics utility yields interesting visual effects with a minimum of fuss. It imparts elasticity to 2-D images, letting you push and pull collections of pixels while retaining the visual integrity of the image. Aug 94

★★★★ **Paint Alchemy 1.0, Xaos Tools, 415/487-7000, \$99.** For the price, these plug-in graphics effects are a tremendous value that both casual users and professional artists can use to design a little chaos into their work. May 94

★★★★ **Pointillist, Pictor GraFX, 310/865-0495, \$39.95.** Stereogram software creates images that look, at first glance, like random dots, but as you focus beyond the page, a 3-D image emerges from the pattern and appears

Star Ratings

to hover inches in front of the background. It's gleefully wacky. Jul 94

★★★★ **PowerDraw 4.0 (5.0), Engineered Software, 910/299-4843, \$795.** The best new feature of this polished 2-D drafting program is an open architecture that supports modules that let you customize the program with application-specific tools, floating palettes, and menu commands. Sep 93

★★ **Ray Dream Designer 3.0.3, Ray Dream, 415/960-0768, \$349.** Although this 3-D-illustration software remains a price leader, unstable operation, misbehaving features, and sluggish performance are problems that need to be rectified. Jul 94

★★★★ **Scenery Animator 1.0.4, Natural Graphics, 916/624-1436, \$149.** Landscape rendering and animation software uses U.S. Geographical Survey data to create remarkably realistic 3-D representations of terrain. Its flaws are few, and our reviewer recommends it. Aug 94

★★★★ **Showplace 2.0, Pixar, 510/236-4000, \$495 to 695.** Adequate, entry-level, 3-D modeler is suitable for illustration and other graphic arts applications. This version offers improved access to MacRenderMan, one of the best renderers around, plus plug-in modeling tools. Apr 94

★★★★ **StrataVision 3d 2.6.3, Strata, 801/628-5218, \$995.** 3-D program includes animation, and is a superior rendering tool and versatile modeler. It's a challenge to learn, however, as the interface is overly dense and sometimes sluggish. Feb 94

★★★★ **StudioPro 1.0, Strata, 801/628-5218, \$1495.** If you need a well-balanced, all-in-one 3-D modeling, rendering, and animation solution, this application is an excellent choice. Mar 94

★★★★ **Transverter Pro 1.0 (1.51), TechPool, 216/291-1922, \$395.** Remarkable graphics-conversion software can read PostScript files and convert them to a variety of formats. As you might expect of a program attempting to fill such a tall order, its conversions are not always flawless, but it can be a lifesaver nonetheless. Nov 93

★★★★ **Typstry 2.0, Pixar, 510/236-4000, \$299.** An approachable interface, animation support, and outstanding Renderman rendering technology make this 3-D type-renderer a popular choice. This version improves on the original, but still lacks canned positioning effects. Jun 94

★★★★ **upFront 2.0, Alias Research, 416/362-9181, \$299.** Capable modeler is something of an acquired taste. However, take the time to learn it and you'll find useful, if unconventional and demanding, tools that are well suited for architectural modeling. Jan 94

MATH/SCIENCE

★★★★ **Alchemy III, Tripos Associates, 314/647-1099, \$950.** Molecular-modeling software can model decapeptides and DNA fragments, in addition to the expected small molecules, with refreshing alacrity on a Mac IIci or better. Sep 93

★★★★ **Caduceus Science Review Macintosh Project 1.0, Scientia, 617/776-3427, \$150 to \$250.** If you're taking the MCAT, you'd be nuts not to buy this interactive science review. With proper use, its 9MB of files are certain to improve your score. Apr 94

★★★★ **CSC ChemOffice 2.0, Cambridge Scientific Computing, 617/491-6862, \$995 to \$1595.** Comprehensive chemistry software is the Mac equivalent of software that seven years ago would have cost \$200,000 and required an equally costly minicomputer. It's a winner. Feb 94

★★★★ **f(z) 6, Lascaux Graphics, 602/299-0661, \$115.** The main problem this math software attacks is four-dimensional visualization. It costs slightly more than a textbook, making it a great educational bargain. Sep 93

★★★★ **InStat 2.01, GraphPad Software, 619/457-3909, \$95.** For scientists with limited statistics backgrounds, the chatty clarity of this lab-oriented statistics software's help screens will be invaluable, while the limited variables and minimal graphics won't be a problem. Nov 93

★★★★ **JMP 3.0, SAS Institute, 919/677-8000, \$695.** This statistics software can be used for a wide range of biological, chemical, and physical-science investigations. New features include floating tool palettes, an annotation tool for data tables, and an experimental-design module. Sep 94

★★★★ **LabView for Mac 3.0.1, National Instruments, 512/338-9119, \$1995.** For large-scale, demanding projects in data acquisition and analysis, this scientific software is an unchallenged standard, in a class by itself. Jul 94

★★★★ **Mathematica 2.2, Wolfram Research, 217/398-0700, \$595.** The one essential program in science and mathematics adds a function browser that makes the program as easy to use as it should be, as well as improvements to computational routines. Sep 93

★★★★ **QC Tools 1.0, Abacus Concepts, 510/540-1949, \$245.** Quality-control tool kit for StatView appears to introduce a slight slowdown in program response, but is generally well designed, well documented, and suitable for quality-control neophytes as well as professionals. Jan 94

★★★★ **Resampling Stats 1.0, Resampling Stats, Inc., 703/522-2713, \$225.** Innovative statistics software has proved itself to be a superior teaching tool in numerous classroom tests. If you have any interest in statistics, you should give this admirably straightforward approach careful consideration. Jun 94

★★★★ **SerePlot 2.12, Scientific Visions, 301/593-0317, \$135.** If you have piles of data and don't need animated, exploding bar-charts in 24-bit color, this scriptable plotting software should be part of your analysis tool kit. Jun 94

★★★★ **Spyglass Transform 3.0 (3.01), Spyglass, 217/355-6000, \$595.** Scientific-visualization software can access data stored in every common format, offers some useful presentation-graphics features, and includes a programming language with a large range of built-in, high-level scientific functions. Sep 93

★★★★ **StatView 4.01 (4.02), Abacus Concepts, 510/540-1949, \$595.** If your work uses statistics for decision support rather than abstract analysis, and you regularly have to present your results to non-statisticians, this is the statistics package for you. Oct 93

★★★★ **Sum Total 1.01, Concurrent Engineering Tools, 602/464-8208, \$99.95.** Exceptional calculator utility is packed with advanced features, including a mode that lets you sample colors and use the numerical color values in calculations. The convenient palette approach causes a distinct time-lag in menu operations. Oct 93

★★★★ **Turing's World 3.0, CSLI Publications, 312/568-1550, \$19.95.** Computer-science educational software lets you investigate some fundamentals in computing at an almost unbelievable bargain price. Feb 94

★★★★ **Visualization of Natural Phenomena, Telos/Springer Verlag, 408/249-9314, \$59.95.** CD-ROM introduction to applying all aspects of computer graphics to scientific imaging covers all disciplines and offers definitive analysis of methods. No other source covers this much material, at this level of clarity. Jan 94

ORGANIZATION/PRODUCTIVITY

★★★★ **Arrange 1.1, Common Knowledge, 415/325-9900, \$349.** This personal information database's flexible, intuitive approach to data-handling makes it an excellent tool for storing all kinds of day-to-day information. May 94

★★★★ **CalendarMaker 4.0, CE Software, 515/224-1995, \$59.95.** Polished, intuitive calendar-making program is straightforward, with a variety of options for customizing your calendar. Some features can be cumbersome. Oct 93

★★★★ **DateBook & TouchBase Pro Bundle 4.0, Aldus Consumer Division, 619/558-6000, \$89.99.** Personal information manager package is now easier to use and offers many new features. The excellent linking between contacts and calendar is the most significant feature. Sep 94

★★★★ **DateView 1.0.1, Advanced Software, 408/733-0745, \$99.95.** If you're willing to sacrifice some features to get simplicity and speed, this calendar/todo manager makes sense. It integrates with the contact manager InTouch. Aug 94

★★★★ **Dynodex for Macintosh 3.5, Portfolio Software, 802/434-6400, \$69.95.** Although this program doesn't currently link to a calendar program, it is an excellent contact manager. This upgrade has a few new features, improved performance, and an easier-to-use interface. Sep 94

★★★★ **Full Contact 2.01, FIT Software, 408/562-5990, \$169.** Personal information manager can handle, with speed and style, tasks that would choke other products, but frequently, using it feels like a full-time job. Aug 94

★★★★ **Now Contact 1.0 (1.0.1), Now Software, 503/274-2899, \$99.** This contact manager has some innovative features and could easily become the top address-book program for the Mac by adding some features, such as file reconciliation. Mar 94

★★★★ **Power Team 1.0, ProVue Development Corp., 714/892-8199, \$149.95.** Personal information manager consists of seven modules: Phone Book, Calendar, Correspondence, Checkbook, Calculator, Expense Report, and Mailing List. It has some bugs, but the data entry features are excellent. Oct 93

★★ **Rae Assist 1.0.2, Rae Technology, 408/725-2850, \$199.** Although this personal information manager offers some fresh ideas, including automatic linking of company and contact information, it's too big and too slow. Jan 94

★★★★ **TimeSquare 1.0, Team Building Technologies, 514/278-3010, \$149.** Fast, flexible, network calendar program has lots of handy features, but it's missing a few as well, such as multiday events and label grouping. Aug 94

PRESENTATION TOOLS

★★★★ **Adobe Premiere 3.0, Adobe Systems, 415/961-4400, \$695.** Solid and dependable QuickTime video-editing software offers a structured, responsive, and flexible interface with enhancements that range from the mundane to the dramatic. It can now mix 99 tracks. Jan 94

★★★★ **Astound 1.0, Gold Disk, 408/982-0200, \$399.** Presentation software lets you include sound, text, and graphics animation with no more effort than pasting in a chart in other products. It's a good value. Nov 93

★★★★ **Authorware Professional 2.0.1, Macromedia, 415/252-2000, \$4995.** Multimedia-

scripting and -presentation software lets you develop complex presentations with amazing speed. Although expensive, it's wonderfully done and will pay for itself in time saved. Feb 94

★★★★ **Avid VideoShop 2.0, Avid Technology, 508/640-6789, \$499.** QuickTime video-editing program shines in its intuitive, easy-to-use interface, although it may fall short on features for hard-core video professionals. Feb 94

★★★★ **CoSA After Effects 1.1, CoSA, 401/831-2672, \$1295.** QuickTime movie editor blurs the boundaries between animation and traditional video-editing. It produces results that simply can't be created in other packages. Oct 93

★★★★ **Deck II 2.1, OSC, 415/252-0460, \$399.** AV Macs turn into digital-audio workstations with this software that enables you to record, mix, modify, and play back CD-quality sound. It doesn't include equalization features. Jun 94

★★ **Elastic Reality 1.0, ASDG, 608/273-6585, \$349.** Exciting morphing tool can create professional-caliber results—if you can figure out how to use it. The needlessly convoluted interface, poor documentation, and inadequate tech support make that a difficult task. Feb 94

★★★★ **FlipBook 1.0, S. H. Pierce, 617/338-2222, \$89.** Animation printing utility lets users make flip-books (consisting of a series of printed images that, through application of an extremely technical thumb-and-finger method, appear to move) out of QuickTime movies, PICS animations, and Scrapbook files. Jun 94

★★★★ **HyperCard 2.2, Apple Computer, 408/996-1010, \$249.** Authoring tool strikes a good balance between power and ease of use, and its price is reasonable. It may not satisfy all your wishes, but it should keep you happily building stacks until the next version comes along. Sep 94

★★★★ **Macromedia Director 4.0, Macromedia, 415/252-2000, \$1195.** Although this multimedia program remains far from easy to use, this admirable upgrade increases the program's power and improves its interface. Multimedia professionals will continue to find it the best package available. Sep 94

★★★★ **Morph 2.0, Gryphon Software, 619/454-6836, \$239.** Easy to use morphing software is beautifully designed, with delightful new features, including the ability to morph QuickTime movies. Using it is as painless as morphing gets. Apr 94

★★ **MovieWorks 2.0.2, Interactive Solutions, 415/377-0136, \$295.** With diligence you can get decent results with this all-in-one QuickTime-based multimedia package. But other entry-level programs make leaping into multimedia easier and more rewarding. Sep 94

★★★★ **Passport Producer Pro 1.0, Passport Designs, 415/726-0280, \$995.** Superb, albeit quite expensive, media-integration package makes assembling even complex presentations surprisingly easy. Path animation is limited to entrances and exits. Apr 94

★★★★ **Persuasion 3.0, Aldus Corp., 206/628-2320, \$339.** Users have plenty of new features to cheer about, including improved tool palettes, extensive charting options, and hypertext functions with this presentation graphics program's upgrade. High memory and disk-space requirements are drawbacks, however. Sep 94

★★★★ **QuickFlix 1.0, VideoFusion, 419/891-1090, \$149.** Approachable QuickTime moviemaking software lacks the high-end features of other programs but costs a whole lot less. Feb 94

★★★★ **Working Model 1.0, Knowledge Revolution, 415/553-8153, \$995.** Animators and

engineers will love this terrific motion simulator that mimics real motion by applying physical laws to objects. It's easy to learn and use, but you'll need some understanding of math and physics. Oct 93

PROGRAMMING

★★★★ **CLimate 1.0, Orchard Software, 617/876-4608, \$59.95.** With a little more documentation and a few more sample programs, this utility that provides a subset of Unix-like commands for the Mac environment could be an irresistible package. Oct 93

★★★★ **Macintosh Common Lisp 2.0 (2.0.1), APDA, 716/871-6555, \$495.** Anyone who likes programming in LISP will be pleased with the environment provided by this version of the standard dialect and its extensive debugging and interface-building facilities. Oct 93

★★★★ **Object Master for Think C and C++, ACI US, 408/252-4444, \$255.** Object-oriented development environment is full of goodies and will pay for itself in about a week due to increased programmer productivity. Apr 94

★★★★ **PowerPacks 2.0, NDG Phoenix, 301/718-8880, \$225.** Programmers' tool kit for 4th Dimension provides 280 external procedures to improve custom applications and exploit System 7 features. Don't expect any quick fixes for 4D's less-than-blistering performance in most areas, though. Oct 93

★★★★ **Smalltalk/V for Macintosh 2.0, Digitalk, 714/513-3000, \$495.** Object-oriented development system is now even more viable for commercial projects, while Digitalk's customer support and documentation set a standard other vendors should emulate. Feb 94

★★★★ **SoftPolish 1.1, Language Systems Corp., 703/478-0181, \$295.** Program-quality-assurance utility systematically checks the resources in a program's interface against a huge laundry list of errors. It's a programming tool for anyone who hopes to produce a commercial Mac application. Sep 93

★★★★ **SourceSafe 2.1, One Tree Software, 919/821-2300, \$295 to \$1195.** Solid, relatively easy-to-use product handles program-development administrative tasks, including version control, for multiplatform programs being created by groups. Sep 93

★★★★ **Symantec C++ for Macintosh 6.0, Symantec Corp., 408/253-9600, \$499.** If you like Think C, you'll like this software-development system, too. For the Mac, it's an excellent opportunity to catch a new wave in programming. Nov 93

★★★★ **VIP BASIC 1.0.1, Mainstay, 805/484-9400, \$295.** Popular programming language lets programmers who know only BASIC get started producing real, if interpreted, Mac programs. It's a serious developer's tool, though it's not on the same footing as VIP-C. Jun 94

★★★★ **VIP-C 1.0.1, Mainstay, 805/484-9400, \$495.** If you've mastered the rudiments of C, this programming-code generator will let you code about ten times faster than you could using only an editor. Its real strength is in rapidly assembling smaller projects. May 94

UTILITIES

★★★★ **AppleSearch 1.0, Apple Computer, 408/996-1010, \$1799.** Although it has some rough edges, this product for archiving and retrieving text is highly useful. It presents retrieved information clearly and extracts text from documents in many formats. May 94

★★★★ **Atticus Vista 1.0, Atticus Software**

Corp., 203/348-6100, \$69.95. Control panel and application automatically catalog the disks you mount on the desktop. It has a few problems, including limited search options, but it can help bring order to disorganized disk collections. May 94

★★★★ **Automap Road Atlas for Macintosh 2.01 (2.04), Automap, 206/455-3552, \$99.95.** Mapping software tells you how to get where you're going better than any other map, atlas, or software our reviewer has seen. Although screen redraw is slow, it's worth it for the written directions and maps the program has to offer. Jul 94

★★★★ **CD AllCache 2.0, CharisMac Engineering, 916/885-4420, \$79.95.** CD-ROM accelerator improves access time by caching a CD's directory and putting its most frequently used data into RAM. Despite this software's limitations, most CD addicts will find the speed improvement worth the trouble. Sep 94

★★★★ **CD-ROM Toolkit 1.0.5, FWB, 415/474-8055, \$79.** Software accelerator can halve the time it takes to open files and search on a CD-ROM. The product supports a wide variety of formats and CD-ROM drives, but users should be aware that playback of QuickTime movies is often uneven. May 94

★★★★ **Connectix Desktop Utilities 1.0 (1.0.4), Connectix Corp., 415/571-5100, \$99.** Although some of the 16 utilities offered in this package are more at home on a PowerBook, this collection offers one-stop shopping at a low price. It's worth it for the file-synchronization, Keyboard Power, and Hot Keys features alone. Nov 93

★★★★ **CopyDoubler 2.0 (2.0.1), Symantec/Fifth Generation Systems, 504/291-7221, \$59.** This utility speeds up copying, lets you queue jobs for background copying, and offers a variety of other useful, copying-oriented features—all at a very reasonable price. Nov 93

★★★★ **Copyright Pro 1.0.3, CSG Technologies, 412/471-7170, \$79.** Utility takes over the Finder's copying function, copies in the background, and allows you to regularly schedule copying. It doesn't speed up copying, however. Nov 93

★★★★ **CPU 2.0 (2.0.1), Connectix Corp., 415/571-5100, \$99.** Reasonably priced collection of utilities for the PowerBook adds new features, including file synchronization, that easily justify the upgrade price. Sep 93

★★★★ **CryptoMatic 1.0.1, Kent Marsh, 713/522-5625, \$99.** Security software offers fast Finder-level encryption and decryption with effective file removal. Although its simplest encryption algorithm isn't quite hacker-proof, it's worth considering. Feb 94

★★★★ **DiskDoubler 4.0, Symantec Corp., 503/334-6054, \$79.95.** In pure efficiency terms, this file-compression software is a winner, but it lacks many features of previous versions, including passwords on self-extracting files and automatic recompression. Aug 94

★★★★ **DiskLock PB 1.0, Symantec/Fifth Generation Systems, 504/291-7221, \$59.** PowerBook security software balances robust security with simplicity and ease of use. It's much harder to crack than most PowerBook utility collections' security features, and will keep out all but the most determined. Jan 94

★★★★ **DiskTop 4.5, PrairieSoft, 515/225-3720, \$99.95.** Organizing a crammed hard drive is a more manageable task with this simple but powerful file-management utility that lets you copy, move, rename, delete, and find files—without using the Finder. Jul 94

★★★★ **The Disney Collection Screen Saver, Berkeley Systems, 510/540-5535, \$49.95.** continues

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Mickey, Goofy, Peter Pan, Ariel, and other Disney favorites cavort around your screen with this screen saver that includes 16 different modules. **Mar 94**

★★★★ **DriveShare 1.03, Casa Blanca Works, 415/461-2227, \$129.95.** This utility allows users to share a removable drive over a network. It's most useful if your network consists of both System 6 and System 7 users, as its advantages over System 7 file sharing are slight. **Nov 93**

★ **DriveTech 1.0, MicroMat Computer Systems, 415/898-6227, \$59.95.** Without decent documentation or clearer error messages, this floppy-drive cleaning and diagnostic program is essentially a \$60 floppy-drive cleaning kit. Since you can buy a cleaning kit without software for \$10, that makes it a bad deal. **Jan 94**

★★★★ **DupLocator 1.03, Midnight Software, 303/933-1013, \$99.** For new Macintosh users who don't have a general file utility, this software that locates duplicate files, as well as performs basic file commands such as moving and renaming files, may be useful. **Jan 94**

★ **eDisk 1.0 (1.2), Alys Software Corp., 415/566-2263, \$149.95.** Driver-level compression software has little to recommend it over file-level, idle-time compression programs. The biggest drawback is the strong potential for disk or file corruption. **Oct 93**

★★★★ **Icon 7, Inline Software, 203/435-4995, \$79.95.** Simple, straightforward utility has a streamlined and intuitive library feature for storing and retrieving icons, plus tools for icon editing. Its icon collection, however, is pretty paltry. **Sep 93**

★★★★ **Icon-It Pro 3.0.6, Olduvai Corp., 305/670-1112, \$129.** Utility allows you to attach custom tool bars to almost any application, including the Finder. The interface is quirky, but you get used to it. **Dec 93**

★★★★ **Icon Mania 1.0, Dabl-Click Software, 818/888-2068, \$69.95.** Delightful icon-editing utility comes with terrific tools for building new icons, including an outstanding thumbnail feature that builds custom icons from graphics files. **Aug 94**

★★★★ **I Like Icon 1.0, Baseline Publishing, 901/682-9676, \$59.95.** Glitzy utility has tools for icon editing, has a nice library of icons, and can create animated icons. Some basic features, such as a text tool, are missing, and the animated icons are fun but impractical. **Sep 93**

★★★★ **MacPak 1.0, Symantec/Fifth Generation Systems, 504/291-7221, \$149.** The quality of this utility collection is uneven—some modules are unpolished—but if you don't already own AutoDoubler, CopyDoubler, and a good file-management program, it's worth the price. **Jan 94**

★★★★ **MacTools 3.0, Central Point Software, 503/690-8090, \$149.** Recovering trashed files is a snap with this utility package that fixes more disk problems than its competition. It includes disk-and-file maintenance, disk repair, virus protection, and backup. **Mar 94**

★★ **Magic Typist 2.0, Olduvai Corp., 305/670-1112, \$129.** If you want to speed up typing of repetitive phrases or if you don't have full use of your hands, this utility, which automates typing of repetitive phrases, may be useful, but some functions work erratically or not at all in Microsoft Word. **Sep 93**

★★★★ **Mr. File 2.0, Softways, 408/978-9167, \$99.** The well-designed background capabilities of this Finder utility make it a handy tool for copying, finding, moving, launching, and renaming files, although it has a few interface quirks. **Dec 93**

★★★★ **Now Compress 1.0 (1.0.1), Now Software, 503/274-2899, \$69.** Compression utility holds its own in a crowded market; it's easy to use, complete, and compresses as well as or better than other options. **Dec 93**

★★★★ **Now Fun, Now Software, 503/274-2899, \$45.** Five control panels let you liven up your Macintosh by customizing everything from menu colors to system sounds. The included screen-saver modules and desktop patterns and pictures are fairly limited, though. **Dec 93**

★★★★ **Open Sesame 1.02 (1.1), Charles River Analytics, 617/491-3474, \$99.** Utility automates Finder operations, such as opening and closing files, without resorting to macros or scripts. It has an elegant interface, but people with strict work habits are more likely to find its suggestions worthwhile than are those who don't follow a routine. **May 94**

★★★★ **OptiMem 1.4.1, Jump Development Group, 412/681-2692, \$129.** Systemwide memory manager monitors RAM use and allocates RAM where it's needed. Works best with software that handles minimum-memory situations effectively. **Mar 94**

★★★★ **PopupFolder, Inline Software, 203/435-4995, \$59.95.** Finder utility is so handy and easy to use, you wonder why it isn't built into the Mac's system software. On the other hand, it's sluggish when readying pop-up menus for every folder. **Aug 94**

★★★★ **PowerMerge 2.0, Leader Technologies, 714/757-1787, \$129.** Powerful file-management tool helps you keep individual files, folders, or entire volumes organized and up-to-date. This version lets you compare and launch documents, rename files, trash superfluous files, and lots more. **Aug 94**

★★★★ **Power To Go 2.0, Claris Corp., 408/727-8227, \$99.** PowerBook utility collection has a few unique slants—including a floating palette that can display battery-life estimates—that keep it above the also-rans. It does lack features of similar products. **Dec 93**

★★★★ **ProFiles 1.0, Dayna Communications, 801/269-7200, \$129.** Unusual new utility lets you group related files and folders for quick access and actions such as making aliases, copying, turning sharing on and off, and more. The recommended RAM allocation of 1MB may be a problem for computers with limited memory. **Aug 94**

★★★★ **QuickKeys 3.0, CE Software, 515/221-1801, \$169.** The simple, unimposing interface of this macro-building utility allows you to build a set of useful shortcuts quickly. **Mar 94**

★★★★ **RAM Doubler 1.0.1, Connectix Corp., 415/571-5100, \$99.** Inexpensive system extension doubles available RAM for many Mac users. There are a number of requirements, however, including System 7, 4MB of physical RAM, and a 68030 board. **May 94**

★★★★ **Redux Deluxe 2.0.2 (2.5), Inline Software, 203/435-4995, \$79.95.** Easy to learn and relatively simple to use, this backup program has some powerful features, such as scripting, but it doesn't have a compression option. **Jan 94**

★★★★ **Retrospect 2.0, Dantz Development Corp., 510/253-3000, \$249.** Powerful backup and archiving software has an improved interface and scripting capabilities, and works well for all levels of users. **Sep 93**

★★★★ **Retrospect Remote 2.0, Dantz Development Corp., 510/253-3000, \$449.** Utility allows fast, automatic backup of networked Macs to a central Mac with a backup device. It worked flawlessly in our reviewer's tests. **Sep 93**

★★ **SafeDeposit 1.2, Dayna Communications, 801/269-7200, \$189.** Automated backup program is easy to set up but slow. Also, unattended backups must be restarted from scratch if disk space runs short and a new disk isn't inserted. **Sep 93**

★★ **Safe or Sorry 1.0, Olduvai Corp., 305/**

670-1112, \$59. Unobtrusive control panel periodically saves all of your keystrokes, but requires System 7.1 and offers no clear-cut advantages when compared with other text-recovery programs. **Oct 93**

★★★★ **SAM 3.5.8, Symantec Corp., 408/253-9600, \$99.** Efficient, thorough virus-protection software slows down system start-up and application launching, but this program is a worthwhile investment for anyone who exchanges or downloads files. **Mar 94**

★★★★ **Screenscapes 1.0.1, Kiwi Software, 805/685-4031, \$44.95.** With more than 600 desktop patterns—and a suite of well-designed modules to transform those patterns—this fun and frivolous utility lifts desktop-pattern design to new heights of elegance. **Nov 93**

★★ **SCSI Director Pro 3.0.6, Transoft Corp., 805/565-5200, \$99.** Utility provides simple, one-button hard disk formatting, but when it comes to doing some of the fancy tricks described on the program's box, the going gets rough and technical support costs \$1.90 per minute. **Sep 94**

★★ **Stacker for the Macintosh 1.0.1, Stac, the Data Compression Company, 619/431-7474, \$149.** As long as you pay attention to the capacity of your hard drive, this driver-level compression product performs reasonably well, except for its slow hard drive read quotient. **Oct 93**

★★★★ **Star Wars Visual Clips, Sound Source Unlimited, 805/494-9996, \$89.95.** Control panel lets you play QuickTime movie clips from *Star Wars* at system events. If you have the money, the hard drive space, and the RAM, this is the kind of totally cool toy that will make you remember why you love your Mac. **Sep 93**

★★★★ **Tempo II Plus 3.0.9, Affinity Microsystems, 303/442-4840, \$179.95.** Very capable macro-creating utility may be daunting for novices but offers plenty of power for advanced users. **Mar 94**

★★★★ **TimesTwo 2.0, Golden Triangle Computers, 619/587-0110, \$149.** This driver-level compression utility is transparent and robust. It caused no problems through a two-month course of testing, on a system with myriad utilities and system software tools. **Mar 94**

★★★★ **Toner Tuner 1.0.3, Working Software, 408/423-5696, \$24.95.** Inexpensive, incredibly useful extension adds a sliding bar to print dialog boxes allowing you to adjust the amount of toner applied to each print job. If you can't save trees, you can at least save toner. **Dec 93**

★★★★ **ultraShield 1.252 (2.0), usreZ Software, 714/756-5140, \$149.** Sophisticated security product combines practically every feature you might need into an integrated package, including a lightning-fast version of the U.S. government data-encryption standard. **Dec 93**

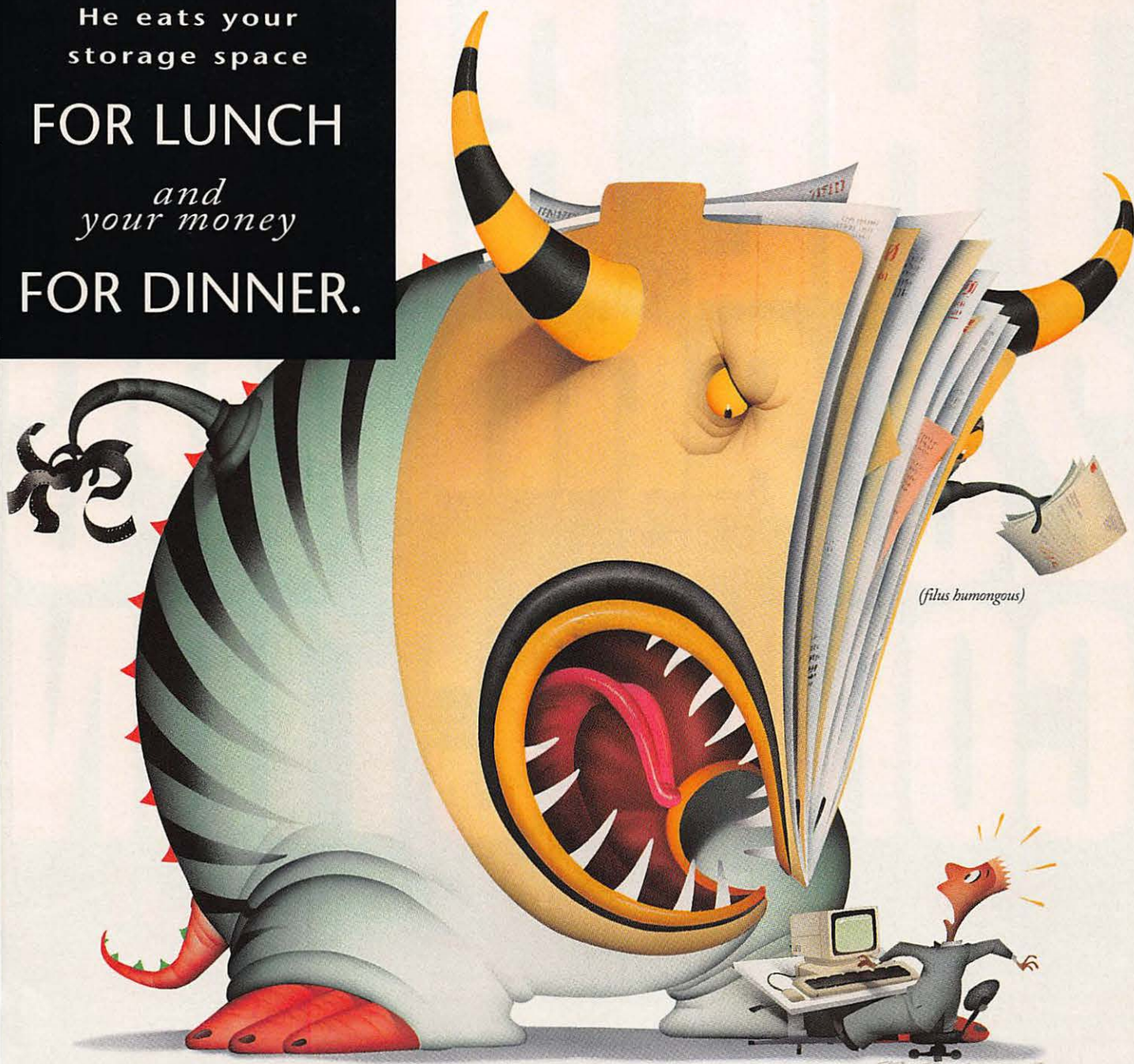
★★ **UnderWare 1.0.1, Bit Jugglers, 415/968-3908, \$59.95.** Inspired, silly fun for your Mac's desktop comes from a control panel that adds three features: a screen saver, desktop patterns, and animations that run on your desktop while you work. The price for this whimsy is mostly in disk space. **Jun 94**

★★★★ **Virex 5.0, Datawatch Corp., 919/549-0711, \$99.95.** The extremely fast, trouble-free performance of this software makes the task of guarding against computer viruses almost painless. Its speed puts it ahead of the pack. **May 94**

★★ **Virtual 3.0.1, Connectix Corp., 415/571-5100, \$99.** If you need to eke out as much virtual memory speed as possible, this utility may be a useful tool. For System 6 users who want virtual memory, it's the only game in town. **Sep 93**

★★★★ **VirtualDisk 1.1a, Continuum Soft-**

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"Its ability to plug-away through poor line conditions puts it in a whole new league." Computer Shopper, July 1994

1st Place — PC Computing, "Great bundle with bargain price—our winner was a favorite with testers." June 1994.

★★★★ — MACWORLD, "Supra is paving the way for life in the fast lane." August 1994.

Circle 132 on reader service card

Star Ratings

ware, 206/695-8136, \$69. Rapid disk cataloging; fast, efficient label-printing; and an excellent disk-copy utility make this software package a wonderful value. Jul 94

★★★★ **Working Watermarker 1.02, Working Software, 408/423-5696, \$49.95.** Simple, useful system extension allows you to print or fax text and/or graphics "watermarks" in the background of virtually any document. Although it has imperfections, it's earned a permanent spot in our reviewer's System Folder. Jan 94

VERTICAL MARKETS

★★★★ **Claire, The Personal Music Coach 1.0.1, Opcode Systems, 415/856-3333, \$129.95.** Musicianship program teaches pitch and interval recognition, sight singing, and intonation. Although the interface is nonstandard, it's logical and easy to learn. May 94

★★★★ **Finale 3.0.1, Coda Music Technology, 800/843-2066, \$749.** Upgraded music-notation software is now infinitely more pleasant to use. Its comprehensive feature set makes it the standard against which all other music-notation products must be judged. Dec 93

★★ **MacInteriors, Microspot, 408/253-2000, \$129.** Correctly placing objects is unduly cumbersome in this interior-design software, but once you catch on to the program's quirks, it's useful. Feb 94

★★★★ **Mayo Clinic Family Health Book 1.2, IVI Publishing, 612/686-0779, \$69.95.** Medical CD-ROM for home use deals with the full gamut of health-care topics, from AIDS to zygotes, although it doesn't include any reference to alternative therapies. Sep 94

★★★★ **Mayo Clinic: The Total Heart 1.0, IVI Publishing, 612/686-0779, \$59.95.** Cardiovascular health and related subjects are the topics of this medical CD-ROM for home use. Although it makes liberal use of drawings, photographs, and animations, video sequences would have been more effective. Sep 94

★★★★ **Musicshop 1.0, Opcode Systems, 415/856-3333, \$149.95.** MIDI sequencer is an excellent choice as a first sequencer. It's powerful enough to satisfy the needs of most MIDI users. Oct 93

★★★★ **Sailing Master 1.1, Starboard Software, 313/662-4393, \$64.99.** Though the slow speed and jerky motion point to less-than-polished programming, this sailboat-racing simulation offers good tactical play and is fun—well worth the price for sailing competitors. Nov 93

★★★★ **SAM-CD, Scientific American Medicine, 212/754-0550, \$395.** Despite a few shortcomings, such as the poor interface for case simulations, this medical reference work—a popular series of publications covering topics in clinical medicine—should prove a worthwhile addition to any medical library. Sep 94

★★★★ **WillMaker 5.0, Nolo Press, 510/549-1976, \$69.95.** Legal software quickly and easily automates the creation of wills, health-care directives and proxies, and final-arrangements documents. It offers excellent supporting explanations, examples, and background. Jun 94

WRITING TOOLS

★★★★ **MacWrite Pro 1.5, Claris Corp., 408/727-8227, \$249.** The clean, uncluttered interface of this low- to middle-level word processor is still one of its major assets. This upgrade adds support for QuickTime, PowerTalk, AppleScript, and more. May 94

★ **The Oxford English Dictionary, Oxford University Press, Electronic Publishing, 212/679-7300, ext.7370, \$895.** CD-ROM dictionary con-

tains 20 print volumes, including half a million words, but the flaws, omissions, unreliability, and unforgivably poor design are unbearable. Apr 94

★★★★ **Random House Unabridged Dictionary, Random House Electronic Publishing, 212/572-2600, \$179.** The most comprehensive American-made dictionary on CD-ROM works within any program and is good at guessing misspelled words. Although some functions don't work reliably, the quality and design of the software are better than those of other dictionaries on CD-ROM. May 94

★★★★ **Spelling Coach Professional 4.0.1, Deneba Software, 305/596-5644, \$195.** If you're considering investing in reference software, this spelling checker, dictionary, and thesaurus is a relatively capable, if expensive, alternative. Oct 93

★★★★ **TextBridge 2.0, Xerox Imaging Systems, 508/977-2000, \$99.** Optical character recognition software is impressive on good documents and can be trained and automated. You won't find that anywhere else at this price. Sep 94

★★★★ **Thunder 7 1.5.3, Baseline Publishing, 901/682-9676, \$99.95.** Stand-alone spelling checker and thesaurus interactively monitors your keystrokes and alerts you to potential errors as they are entered. It quickly and transparently prevents you from making embarrassing typos. Nov 93

★★★★ **WordPerfect for Macintosh 3.0 (3.0a), WordPerfect Corp., 801/225-5000, \$495.** The innovative interface of this word processor uses context-sensitive button bars and expandable rulers to make innumerable features accessible with a click of the mouse. It's an accomplishment in ease of use. Mar 94

★★★★ **WriteNow 4.0.1, WordStar International, 415/382-8000, \$119.95.** Tidy word processor's conservative use of memory (the application fits into a dainty 600K partition) and graceful interface will continue to win it enthusiastic fans. This version adds elegant table capabilities and several PowerBook-friendly features. Jun 94

★★★★ **A Zillion Kajillion Rhymes 1.0, Eccentric Software, 206/628-2687, \$49.95.** Rhyming dictionary is quick, small, simple, and self-contained; but it only rhymes with the roots of search words (and ignores -ed, -s, and -ing endings). Nov 93

Hardware

INPUT DEVICES

★★★★ **Computer Crayon, Appoint, 510/463-3003, \$49.** The kid contingent's verdict was a definite thumbs-up on this brightly colored input device that's shaped like a thick pencil. The buttons can be hard for smaller children to press, and serious computer artists should still opt for a drawing tablet. Oct 93

★★★★ **DrawingSlate, CalComp Digitizer Division, 714/821-2000, \$395.** Digitizing tablet is a good, compact, low-cost implementation of pressure sensitivity, although the battery-operated stylus is a bit heavy. Jun 94

★★★★ **Gulliver, Appoint, 510/463-3003, \$119.** This diminutive mouse is hard to hold comfortably for an extended period, but it works well on almost any surface and is an acceptable option for PowerBook users. Oct 93

★★★★ **PenDirect ADB, FTG Data Systems, 714/995-3900, \$498.** Input device lets you manipulate items on the Macintosh screen using a special stylus called a light pen. It works well, although it seems ergonomically inferior

to a mouse for routine tasks. Mar 94

★★★★ **TrakMate, Key Tronic Corp., 509/928-8000, \$149.** Input device integrates a trackball into a wrist pad. While the design is interesting, it's not for everyone. Feb 94

★★★★ **Wacom UD-1212R, Wacom Technology Corp., 206/750-8882, \$749.** Graphics tablet with pressure-sensitive stylus is easy to use and highly customizable, though it's incompatible with AppleTalk and AppleTalk Remote. May 94

MISCELLANEOUS HARDWARE

★★ **ACS100, Altec Lansing Consumer Products, 717/296-2818, \$180.** Lightweight powered speakers don't sound as good as they should. There's too much emphasis on the high end at the expense of the midrange, and they hiss noticeably. Dec 93

★★ **ACS150, Altec Lansing Consumer Products, 717/296-2818, \$150.** Subwoofer rounds out the sharp tones of the ACS100, but the bass response is neither punchy enough nor loud enough, and the unit is about the size and weight of a concrete block. Dec 93

★★★★ **AppleDesign Powered Speakers, Apple Computer, 408/996-1010, \$179.** Tall and curvy powered speaker set looks and sounds good and can produce uncomfortably high volumes without noticeable distortion, but the bare-wire-and-terminal connections aren't user-friendly. Dec 93

★★★★ **Apple Newton MessagePad, Apple Computer, 408/996-1010, \$699.** Although Apple released this personal digital assistant too early and marketing hype led to mistaken expectations, this is a very intelligent piece of work with an impressive variety of serious business uses. Dec 93

★★★★ **Apple PowerCD, Apple Computer, 408/996-1010, \$400.** This extremely versatile and beautifully designed portable CD-ROM drive offers impressive audio and Photo CD features, but if you're a serious CD-ROM user, it's too slow to satisfy. Jan 94

★★★★ **Ear Phone Streamline AV, Jabra Corp., 619/622-0764, \$169.** As a hands-free telephony tool—and as a replacement for the Apple PlainTalk microphone—this telephone/speech-recognition earpiece is a winner. Its biggest drawback is that you can't hear other Mac sounds, such as modem tones, when it's plugged in. Jul 94

★★★★ **EMBARC, Embarc Communications Services, 407/364-2000, \$395 plus fees.** If you're a PowerBook user who is frequently in places with no telephone and you need timely delivery of electronic news and E-mail, this portable wireless message service may prove useful, but the cost may be prohibitive to others. Sep 93

★★ **G-Vox, Lyrrus, 215/922-0880, \$399.** Hardware-software guitar-instruction package lets your Mac "hear" the notes you play on your guitar. Although the hardware works well, the software has some basic problems and doesn't live up to the hardware. Apr 94

★★★★ **Hello Music, Yamaha Corp. of America, 714/522-9240, \$449.** MIDI starter kit includes an impressive tone generator that's compatible with General MIDI Level 1 and Roland MT-32, but the included software is functional at best. Dec 93

★★ **Macintosh TV, Apple Computer, 408/996-1010, \$2079.** As a computer, this combination computer-television-CD player is sleek but slow. You can get faster performance and better expandability from several less-expensive Performa models. Apr 94

Star Ratings

★★★ **PowerLink Presenter, E-Machines, 503/646-6699, \$499.** Simple, compact Duo dock wobbles a bit when plugged in but provides fine support for a variety of displays, plus ports for ADB, floppy drive, and sound output. Nov 93

★★★ **PowerPlate, Technögin, 513/321-1777, \$169.95 to \$299.95.** Line of long-lived, external PowerBook battery packs, each of which lets you work for three to five times as long as the usual PowerBook battery. Unfortunately, the System 7 power manager periodically alerts you that your battery is not charging and dims the screen though battery pack has hours of time left. Mar 94

★★★ **RCD-202, Pinnacle Micro, 714/727-3300, \$3995.** Writable CD-ROM drive is good for archiving data simply and inexpensively, but it's incompatible with many hard drives. Mar 94

★★★★ **SCSI Sentry, APS Technologies, 816/483-6100, \$99.** Although the price of this terminator may seem steep, this device may well be the cure for SCSI woes. Our reviewer heartily recommends it. Sep 94

★★★★ **ThinPack, VST Power Systems, 508/287-4600, \$199.95.** External battery pack for PowerBooks is compact, with a lightweight design. It comes with handy power-management utilities. Mar 94

★★★★ **TurboDialer, Advanced Software, 408/733-0745, \$79.95.** Automatic telephone dialer is a well-executed product, except for occasional computer noise that seeps into phone conversations. If you constantly dial phone numbers that are stored in your computer, this product will save you time and energy. Jul 94

★★★★ **Yamaha YST-M10 Powered Monitor Speakers, Yamaha, 714/522-9240, \$149.95.** Powered speakers have a good balanced sound and a great volume range at an outstanding price. Apr 94

MODEMS/NETWORK HARDWARE

★★★★ **AsantéHub 1012, Asanté Technologies, 408/435-8388, \$1299.** This 12-port, 10BaseT Ethernet hub works right out of the box and is a premium device at a bargain price. Dec 93

★★★★ **Cypress PhonePro 1.2, Cypress Research Corp., 408/752-2700, \$349 to \$950.** By improving its integration with FaxPro and with PowerTalk and PowerShare, this powerful telephony software has greatly extended its business scope. May 94

★★★ **DataLink PB; Axcell Cellular Interface, Applied Engineering, 214/241-6060, \$824.** If you need a full-blown office on the beach, this PowerBook cellular-modem package with automatic answering machine is a well-executed solution. Each recorded second requires 25K of disk space. Nov 93

★★★★ **EtherWave, Farallon Computing, 510/814-5000, \$129.** If you need to expand your network at a reasonable price with minimal fuss, get this Ethernet transceiver. Instead of providing only one 10BaseT twisted-pair jack, it includes a second jack that allows you to daisy-chain to another device through an additional 10BaseT line. May 94

★★★ **OneWorld Fax, Global Village Communication, 415/390-8200, \$999.** Easy-to-use network fax product lets an office share fax-sending resources without dedicating a hard drive and CPU; however, it can't receive faxes and can't queue more than one fax document at a time from a single CPU. Aug 94

★★★ **PerFit Port-A-Com, PerFit, 303/530-7333, \$349.** Compact, ADB-powered, high-speed fax/data modem is difficult to configure, due to its Spartan and poorly organized documentation, but is still a solid product

at a reasonable price. Nov 93

★★★ **SupraFaxModem 144PB, Supra Corp., 503/967-2400, \$349.95.** If you're looking for a high-speed internal modem for your PowerBook, and you want to save a few bucks, this modem is worth considering. Disabling its fax software solved occasional transfer problems. Nov 93

★★★★ **SupraFaxModem 288, Supra Corp., 503/967-2410, \$349.95.** This 28,800-bps fax modem is a very good performer, as good as or better than 14,400-bps modems, and the price of admission isn't terribly steep. Combined with fast, stable fax software and a good terminal program, it's hard to beat. Aug 94

★★★ **Watermark Message Central 2.0.2, High Tide Software, 510/704-9927, \$499.** If you're willing to put in a lot of effort, you'll find this highly sophisticated voice-mail system supremely flexible. It includes a specially modified modem with voice chip, as well as fax software and telecommunications software. Jul 94

PRINTERS

★★ **Address Express, CoStar Corp., 203/661-9700, \$499.** Flaky performance and system crashes plagued this envelope-and-label printer in our tests, but the print quality was good. Oct 93

★★★★ **Apple Portable StyleWriter, Apple Computer, 408/996-1010, \$439.** Sleek, portable ink-jet printer weighs 4½ pounds and is a pleasure to use. It uses standard StyleWriter cartridges. Jan 94

★★ **Brother HJ-400, Brother International, 908/356-8880, \$369.** Compact, 360-dpi ink-jet printer is fairly slow and does not allow background printing. Some large files require additional application memory to print correctly. May 94

★★★★ **Color StyleWriter Pro, Apple Computer, 408/996-1010, \$629.** Color printer represents one of the best values in the inexpensive color-printing market. It's fast, produces nice-looking output, and has some good features, including a great way of handling color ink cartridges. Sep 94

★★★★ **DeskWriter 310, Hewlett-Packard, 800/752-0900, \$379 to \$455.** Versatile, low-cost ink-jet printer is a 4.3-pound, battery-powered portable. With its 60-page sheet feeder, it's also a great desktop printer; and with a \$49 color print cartridge, it offers inexpensive three-color printing. Mar 94

★★★ **HP LaserJet 4ML, Hewlett-Packard, 800/752-0900, \$1279.** Primarily for those of you who use a PC or work in a small, mixed-platform environment, this energy-efficient laser printer offers automatic port and language switching, and is a good buy. Its advanced PC features may not be worthwhile for those who use Macs only. May 94

★★★★ **LaserWriter Select 360, Apple Computer, 408/996-1010, \$1599.** Low-cost, high-performance, 10-ppm printer is perfect for small LocalTalk or mixed networks. For bigger networks, consider buying more than one; they're more cost-effective than a 20-ppm printer. Apr 94

★★★ **microLaser Pro 600, Texas Instruments, 800/848-3927, \$2148.** Overall, this workgroup printer is fast and provides good print quality. The price is steeper than that of other products, but if you work in a busy office where a really fast printer makes everybody's life easier, the higher price may be worth it. Jul 94

★★★ **MobileWriterPS, Mannesmann Tally Corp., 206/251-5524, \$999.** Fast, portable printer is currently the only PostScript portable available. While the

print quality is quite good on glossy laser paper, it's mediocre on inexpensive bond. Dec 93

★★★ **Notebook Printer II, Citizen America, 310/453-0614, \$399.** If weight and size are your biggest concerns in choosing a portable printer, and you print primarily in black and white, this thermal-fusion printer may be a good choice. If speed is at all an issue, however, other options may be preferable. Jun 94

★★★★ **Personal LaserWriter 320, Apple Computer, 408/996-1010, \$959.** If you've been holding out for a high-quality personal laser printer that's fast enough to share over LocalTalk, the small inconveniences of this 300-dpi printer are easily outweighed by its low price, good speed, and PostScript Level 2 support. May 94

★★★★ **PowerPrint 2.5, GDT Softworks, 604/291-9121, \$149.** Ingenious hardware-software combo lets you print from your Mac to almost any PC printer. It supports over 1000 printers, ranging from aging dot matrix models to the newer color ink-jet and laser printers. Sep 94

★★★ **P-Touch PC, Brother International Corp., 908/356-8880, ext. 4307, \$449.95.** Versatile label printer is easy to set up and use, and produces high-quality output. The cost per label is high, though, and the documentation is weak. Sep 94

★★ **QMS ColorScript Laser 1000, QMS, 205/633-4300, \$7999.** Color laser printer succeeds in combining the versatility of monochrome laser printing with attention-getting color, but if you don't need to chase rainbows right away, you might wait and see if competition drives capabilities up. Jul 94

★★★ **Silentwriter 640, NEC Technologies, 508/264-8000, \$800.** With 3MB of RAM, PostScript Level 2 support, and a 6-ppm engine, this printer is a capable performer. Generally, it represents hassle-free printing, but it doesn't handle single sheets of paper well. Jun 94

★★★ **Smart Label Printer Pro, Seiko Instruments, 408/922-5900, \$299.95.** If you need to print only a few labels at a time, this label printer may be an expensive but good choice. It prints very quickly, and with excellent print quality. May 94

SCANNERS

★★★★ **Coolscan LS-10e, Nikon Electronic Imaging, 516/547-4200, \$2600.** Compact desktop scanner for digitizing images from 35mm transparencies is slow, but delivers images good enough for newsprint publications and some catalogs. Dec 93

★★★★ **IX-4015 Color Image Scanner, Canon Computer Systems, 714/438-3000, \$1169.** The price of this color flatbed scanner is competitive, and its speed and excellent bundled software make it easy to use and a good choice for the small office. If you can get by without legal-size scans, it should serve you well. Jul 94

★★★ **LightningScan Portable, Thunderware, 510/254-6581, \$459.** PowerBook owners will find this hand scanner's modem- or serial-port connection, lightweight interface, and total portability well worth the cost, although the scanner is incompatible with some desktop Macintoshes. Dec 93

★★★★ **Mirror 800 Plus Color Scanner, Mirror Technologies, 612/633-4450, \$1299.** Add the NuBus JPEG board (\$300) and easy-to-use 35mm transparency scanning module (\$599) and you get a nifty—if slow—desktop scanning package for a reasonable price. Jan 94

★★★ **ScanMaker 35t, Microtek, 213/321-2121, \$1999.** Speedy 35mm film scanner accommodates

loose film and delivers a good image, but the included software is weak. Dec 93

★★★ **ScanPlus Color 6000 for Mac, PlusTek USA, 408/980-1234, \$749.** Small, inexpensive sheet-fed color scanner is not appropriate if exact color matching is critical, but it is otherwise a good, economical option. Sep 93

SYSTEMS/STORAGE

★★★ **Conley SR2 RAID System, Conley Corp., 212/682-0162, \$25,335.** While RAID technology is typically praised for its fault-tolerance rather than its speed, this high-performance storage system proves that you can have both. For critical tasks requiring redundancy and round-the-clock operation, this is one of the best Mac RAID systems shipping. Sep 94

★★★★ **DataPak 105, Mass Microsystems, 408/522-1200, \$949 to \$1049.** Well-built 105MB SyQuest drive comes with a decent, no-frills cartridge-formatting package and a copy of 7th Heaven. The preformatted cartridges have a lifetime warranty. Sep 93

★★★ **EtherDock, E-Machines, 408/541-6100, \$699.** Heavy-duty Duo docking option is equipped with a full set of 11 ports, including an Ethernet port. The locking mechanism is alarmingly wobbly—although reliable enough to ensure a good connection. May 94

★★★ **Expert Pad PI-7000, Sharp Electronics Corp., 800/993-9737, \$899.** Personal digital assistant features the advantages of the Newton, in a better industrial design and at a comparative price. If the battery lasted longer and the message network were implemented, the PDA revolution could begin. Feb 94

★★ **HP Optical Disk Library 10LC, Hewlett-Packard, 800/752-0900, \$9495.** Optical jukebox may fill the need for 10 gigabytes of online storage, but its performance is poor, and the software lacks the features needed for adequate management. Jan 94

★★★★ **Infinity 105 Turbo, Peripheral Land, 510/657-2211, \$795 to \$894.** Small, light, quiet, inexpensive 105MB SyQuest drive is ingeniously packaged and ideal for both desktop and PowerBook use. Sep 93

★★★★ **LC 575, Apple Computer, 408/996-1010, \$1699.** For students and small-business professionals who want high power and the convenience of having everything integrated into one case, this 33MHz 68040 system is an ideal choice. Jun 94

★★★ **Newton MessagePad 110, Apple Computer, 408/996-1010, \$599.** This is the personal digital assistant that Apple should have shipped in August 1993, with improved handwriting recognition, including deferred and letter-by-letter recognition. It also has more memory, longer battery life, and a more efficient design. Aug 94

★ **NuTek Duet, NuTek USA Corp., 408/973-8799, \$2996.** Mac workalike is both a PC and a Mac in a single box, but because of many incompatibilities and problems, the Duet is not a computer anyone should consider using for serious work. Feb 94

★★★★ **OrangePC Model 200 Series, Orange Micro, 714/779-2772, \$1139 to \$3237.** If your goal is to get a Mac that runs Windows as fast as a PC, you can't get there from here. If your goal is to get business-level performance for day-in, day-out use, these PC coprocessor cards are probably your best choice. Aug 94

★★★★ **PLI 2.4 GB MiniArray, PLI, 510/657-2211, \$4815.** Slick and elegant RAID drive worked beautifully in tests, but it costs more than other options and the QuickSCSI board is sensitive to minor SCSI problems. Apr 94

★★★★ **PLI Infinity 270 Turbo, PLI, 510/657-2211, \$651.** This 270MB SyQuest drive is fast, reliable, and a very good product. The cost of the medium is competitive with that of optical drives. Sep 94

★★★★ **PowerBook 140 F/25 Upgrade, Digital Eclipse Software, 510/547-6101, \$399.** By changing the oscillators and adding an FPU, Digital Eclipse changes PowerBook 140s into 170s, minus the active matrix screen. While the upgrade seems expensive, it's the only way to extend the viability of a 140. Dec 93

★★ **PowerBook 180c, Apple Computer, 408/996-1010, 4/80 \$4169.** The active matrix screen of this color notebook computer is beautiful but so small that its usefulness is very limited. Sep 93

★★★★ **PowerBook Duo 270c, Apple Computer, 408/996-1010, 4/240 \$3099.** Notebook computer meets all the demands of power users; it weighs less than five pounds, features a color active matrix display, and offers longer battery life. The lack of a floppy drive can be inconvenient, though. Feb 94

★★★★ **Power Macintosh 6100/60, Apple Computer, 408/996-1010, base model \$1819.** Given its price and performance, this Power Macintosh is hard to resist. When developers offer in PowerPC format the software that most business users run daily, this should be a system that will give you power to spare. Jun 94

★★★★ **Power Macintosh 8100/66, Apple Computer, 408/996-1010, \$2899.** Midrange Power Mac makes an outstanding workstation whose power should last for several years. The price is nothing to take lightly, but this system delivers every dollar's worth. Aug 94

★★★★ **Power Macintosh 8100/80, Apple Computer, 408/996-1010, \$4249.** While this system doesn't quite offer the excellent price/performance ratio of the other available Power Macs, you should consider it if you're a high-end user moving your work over to RISC-based computing. Aug 94

★★★★ **Quadra 605, Apple Computer, 408/996-1010, 4/80 \$979.** Never before has Apple offered so much performance for so little money. The performance and price of this 040-based machine match those of a standard entry-level 486SX-based Windows PC. Mar 94

★★★★ **Quadra 840AV, Apple Computer, 408/996-1010, 8/230 \$4069.** Technological tour de force uses a 40MHz 68040 and an AT&T 3210 digital signal processor, and is brimming with sophisticated speech-recognition and audiovisual technology. Beware of some hardware and software incompatibilities. Dec 93

★★★ **SCSI MicroDock, Newer Technology, 316/685-4904, \$175.** Tiny Duo docking station weighs just under 4½ ounces and barely 5 inches long. It adds only an ADB port and a SCSI port—but both are useful. May 94

★★★★ **SledgeHammer2000FMF, FWB, 415/474-8055, \$3179.** RAID drive is both fast and inexpensive. Although it can be a bit noisy when accessing data, it's a good deal. Apr 94

★★★ **SmartStack, Envisio, 612/628-6288, SmartSource \$119; SmartModules \$289 to \$1379.** The SmartStack line of modular storage peripherals may be neatly stacked on top of a common power supply to reduce desktop clutter and cabling problems. Sep 93

★★★ **Turbo 040, DayStar Digital, 404/967-2077, \$1899.** This accelerator card is equipped with the fastest 68040 chip available and is as fast as or faster than any Macintosh in processor-intensive tasks. For the price, however, it may make more sense to trade up to a faster computer. Dec 93

VIDEO/DISPLAY

★★★ **Apple QuickTake 100 for Macintosh, Apple Computer, 408/996-1010, \$749.** If you're in the market for a medium-quality, digital color camera that costs less than \$1000, this is the best deal around. But if you're not in a hurry, you may want to wait until some of the camera's more obvious problems, such as its fixed-focus lens and lack of a zoom option, are ironed out. Jul 94

★★★ **AudioVision 14 Display, Apple Computer, 408/996-1010, \$769.** Monitor integrates audio and video with built-in speakers that produce surprisingly rich, full-bodied sound. The display, while nice, is small for multimedia work. Dec 93

★★★ **Dycam Model 3, Dycam, 818/998-8008, \$895.** Low-end, digital still camera is easy to use, and is a solid product if Instamatic grade gray-scale meets your image-quality requirements. Sep 93

★★★ **Editing Aces Suite, RasterOps, 801/785-5750, \$3899.** Video professionals can record and play back full-screen movies in 24-bit color with 16-bit CD-quality sound with these products. Despite flaws, this package represents a step forward in QuickTime technology. Nov 93

★★★ **Intellicolor Display/20, Radius, 408/434-1010, \$3199.** Although with its exceptional brightness and clarity this monitor would be a fine addition to any designer's desk, the included Intellicolor software, which lets you control the settings of your display, doesn't offer much added value. Apr 94

★★★ **L-TV Portable, Focus Enhancements, 617/938-8088, \$299.** Sturdy, inexpensive, external TV-converter plugs into your Mac and converts video output to NTSC. It provided a crisp, clean image, but mild flickering and conspicuous shimmers were persistent. Aug 94

★★★ **L-TV Pro NuBus, Focus Enhancements, 617/938-8088, \$399.99.** NuBus card converts your Mac's RGB video signal to NTSC so you can use your Mac with a TV or VCR. It supports a wide range of Macs, but the image has some flicker and distortion, despite flicker-filtering software. Aug 94

★★★★ **MovieMovie, Sigma Designs, 510/770-0100, \$349.** This 7-inch NuBus video-capture board may be what you've been waiting for. The price is right, and the addition of on-board audio input is a plus, even if it is only mono. Dec 93

★★★ **PaintBoard Turbo, RasterOps, 408/562-4200, \$1499.** Midrange video board supports 24-bit color on monitors up to 17 inches and resolutions as high as 1024 by 768 pixels. If you can live without changing resolutions on the fly, it's a reasonably good deal. Oct 93

★★★ **The Presenter Plus Mac/PC, Consumer Technology Northwest, 503/643-1662, \$429.** Small, external TV-converter supports output to television from most Macs with built-in video. It does a barely passable job of providing a stable image. Aug 94

★★★ **QA-350 LCD, Sharp Electronics Corp., 800/237-4277, \$2495.** At less than half the cost of a typical active matrix LCD panel, this passive matrix projection panel offers an economical alternative for presenters who don't need multimedia capability. Jul 94

★★★ **Simply TV, E-Machines, 408/541-6100, \$439.** Easy-to-install video card plugs snugly into a PDS slot, and allows you to use your Mac with a television for display. The image is impressively flicker-free, but the resolution is limited to 256 colors. Aug 94

★★★ **VideoToolkit 2.0.1, Abbate Video, 508/376-3712, \$279.** Despite a few rough edges, this is an attractive, inexpensive solution for those who need to catalog and edit videotapes on a budget. Sep 93

The PowerBook 500 Series. In depth.

Welcome to the next generation of PowerBook®.

Four new Apple® PowerBook computers that redefine, once again, what a notebook computer can be.

One look tells you these are very new indeed. The flowing shape. The sleek lines. The futuristic curves.

But the new appearance is only your first clue to the dramatic changes, refinements and improvements we've engineered inside.

More power. The PowerBook 500 series is designed around the Motorola 68LC040 processor—a chip that offers far more power than the chips that powered previous PowerBook models. In benchmark tests, the new PowerBook 540c running at 66/33 MHz was 80% faster than the fastest previous PowerBook. (Its gray-scale counterpart, the 540, is equally fast.) And with the same chip running at 50/25 MHz, the 520 and 520c aren't far behind.

We've supported that processing power with 80% more memory capacity (up to 36MB), 56% more internal storage capacity (up to 320MB) and built-in high-performance Ethernet networking (as well as LocalTalk®).



This makes the PowerBook 500 series powerful enough not only for word-processing long documents or Fortune 500-sized spreadsheets, but also for doing fieldwork with programs like Adobe Photoshop and other high-end, graphics-intensive programs.

Add SoftPC software from Insignia Solutions Inc., and you've got the ability to run MS-DOS programs as well.

The 500 series offers the possibility of even more power later, because you can upgrade to PowerPC™ technology when it's available for PowerBook. (Contrast this with 486 notebooks that aren't upgradable to Pentium technology.)

More precision. Kindly direct your attention to the revolutionary new Apple trackpad pointing device that replaces the trackball and is centered on the comfortable palm rest.

The trackpad brings a new level of precision to PowerBook computing.



The trackpad's ultrasensitive surface senses the touch of your finger, tracks it across the pad and moves the cursor across the screen accordingly.

This intuitive method of moving the cursor, combined with the new dual-scan and active-matrix screens, gives you much more precise control over the location of the cursor and makes extremely detailed work

possible (it's actually precise enough for photo retouching) wherever you happen to be.

The PowerBook 540c has what may well be the finest screen ever to grace a notebook computer: an active-matrix, 9.5-inch display capable of showing thousands of colors at the same time.

Combined with QuickTime® video and built-in stereo sound, these screens make for truly spectacular presentations in the most unspectacular locations: on a crowded plane, in a noisy diner, wherever.

More expandability. The new PowerBook 500 series includes a lot of things that aren't standard on ordinary notebook computers.

Things like built-in file sharing and networking. Stereo sound and video-out. Macintosh PC Exchange™ software, eWorld™ and PowerBook File Assistant file-synchronizing software. And we've even

included Apple Remote Access software that allows any

modem-equipped PowerBook to work with the Macintosh® computer on your desk, and with your network, as if you were sitting in your office. Even during those times



These are the first PowerBook computers to use PCMCIA technology.

when your office happens to be thousands of miles away.

Still, there's a lot of room to grow. These are the first PowerBook computers to come with a built-in Processor Direct Slot (PDS) for third-party expansion modules. And they're also the first ones to offer the optional plug-in PowerBook PCMCIA Expansion Module, so you can use two Type II or one Type III PCMCIA card for even more flexibility.

You can even install an optional 19,200-baud internal modem to send and receive information quickly, and when it becomes available, a third-party cellular interface for convenient wireless access to your office network.

More battery life. Even the batteries have been thoughtfully redesigned. The PowerBook 500 series can use two PowerBook Intelligent Batteries. These high-powered NiMH batteries use special processors within each pack to monitor battery power and the new PowerBook Control Strip — power management software that tells you exactly how much time you have before you need to recharge the batteries.

	PowerBook 520	PowerBook 520c	PowerBook 540	PowerBook 540c
Processor	Motorola 68LC040 @50/25 MHz		Motorola 68LC040 @66/33 MHz	
Display	FS1N Gray-Scale	Dual-Scan Color	Active-Matrix Gray-Scale	Active-Matrix Color
Hard Drive	160MB	160MB	240MB	320MB
Memory	4MB DRAM expandable to 36MB			
Battery Life	Up to 7 hours with 2 batteries		Up to 6 hours with 2 batteries	
Audio	16-bit stereo in and out, built-in stereo speakers and mono microphone			

The result is 40% more battery life than before — up to seven hours per charge — when using both batteries.

They recharge faster, too — in as little as two hours for both batteries when the PowerBook is asleep or shut down. And the batteries even recharge while you're using the PowerBook.

More information. While this has been an abundance of information, by any standard, it can't serve as a substitute for a personal demonstration. Something that can be easily arranged at your authorized Apple reseller. To find the one nearest you, simply call 800-732-3131, ext. 100. (In Canada, call 800-665-2775, ext. 910.)

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Introducing the PowerBook 500 Series.
The next generation of PowerBook.



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Mirror Establishes A New Performance Standard

All configurations include a fast and wide SCSI-2 card that propels data via a 32-bit data path. Most Macintosh computers are limited to data transfer rates of 2MB/sec., but a Mirror RAID system gives you unparalleled data throughput of up to 15 MB/sec! In addition, our disk arrays are compatible with most high-end audio and video editing systems.

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RAID technology is available in a number of levels, each representing a different way of partitioning data on your hard drives. Mirror's two, three and four drive systems allows support for RAID Levels 0 and 1.

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Mirror's five and ten drive hot-swappable arrays are ideal for archival storage and large database applications. These systems feature

RAID Levels 0, 1, 4 and 5 support. Plus, you get our exclusive hot-swappable drive technology, "on-the-fly" data reconstruction, a drive failure warning feature and automatic block repair—giving you unparalleled data integrity.

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We invite you to try a Mirror RAID system risk-free—if you decide for any reason that it's not for you, simply return it within 30 days for a refund. We offer a complete line of RAID solutions, from 2GB to 34GB, to fit every need and budget. Call us toll-free at 1-800-643-3371 for complete information on Mirror disk array systems.

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SPECIAL HARDWARE AND SOFTWARE BUYING OPPORTUNITIES

Selected and edited by Charles Barrett

The following listings include both time-sensitive promotions and open-ended offers being sponsored by Macintosh vendors and their resellers. The listings indicate which products have been awarded a star rating in *Macworld's Reviews* (products rated ★★ or lower are not eligible for inclusion), have been selected as an **Editors' Choice**, or have won a **World-Class** award. In some cases, the editorial evaluation quoted is for an earlier product version. The ☑ symbol indicates that the product is Power Mac related.

When placing an order, please mention that you saw the offer in *Macworld*. Should any problems arise, contact the *Streetwise Shopper* editor by fax (415/442-0766), phone (415/978-3241), or mail (*Macworld*, 501 Second St., San Francisco, CA 94107).

Vendors and resellers desiring to have products and services included in this section are encouraged to contact the *Streetwise Shopper* editor with particulars.

BUNDLES

Bernoulli MultiDisk 150 + Macromedia Director 4.0

Omega Corporation is bundling Macromedia's \$1195 multimedia/animation program (Sep 94 ★★★★★; 1994 **World-Class**) with its \$589 MacTransportable Bernoulli MultiDisk 150 removable-disk drive. This bundle also includes a 150MB Bernoulli cartridge on which Director has been preinstalled to ensure fast start-up. Available on or before 9/1/94 for about \$850. Call 800/777-6654 for more information.

☑ DayStar Digital PowerPro 601 + Ray Dream Designer 3.1

DayStar Digital is including a free copy of the \$349 native Power Mac version of Ray Dream Designer 3-D illustration software (Aug 93 "Depth-Defying Design" **Editors' Choice** for version 2.0.4; Sep 92 ★★★★★ for version 2.02) with its PowerPro 601 PowerPC processor-based card that upgrades the Quadra 650, 700, 800, 900, 950, and Centris 650 to Power Macintosh 7100 and 8100 performance levels. Call 800/962-2077 for more information.

EdgePrint Image-Pro Package Visual Edge Technology is offering this \$24,995 bundle consisting of a \$14,995 ImageMaster EdgePrint electrostatic RIP, a \$5995 ImageJet EdgePrint ink-jet RIP, and a \$1995 pairing of the LogoStamp application for batch-processing images and text combined with the PrintViewer proofing utility. The bundle also ships with a \$995 software module supporting Yarc Systems' PowerPC-based NuBus accelerators and S. H. Pierce & Co.'s PosterWorks (Consumer Edition) large-format production tool (Aug 93 ★★★★★ for PosterWorks 3.0). Call 800/662-0808 for more information.

NetWare 3.12 or NetWare 4.02 + GroupWise 4.1 Novell is offering a free copy of its \$4700 GroupWise (formerly WordPerfect Office) workgroup/collaboration application for network environments to customers who purchase an upgrade to NetWare 3 or 4 (ten-user version or above)

between 8/1/94 and 10/31/94 for prices recently reduced by an average of 15 percent. Third-party upgrades can be from any competitive network or peer-to-peer operating system. Available through authorized resellers or by contacting Novell at 800/346-7177. Offer expires 10/31/94.

Newton MessagePad + TapWorks Apple Computer is offering customers who purchase either its Newton MessagePad 100 or 110 PDA between 7/1/94 and 9/30/94 a free copy of its \$119 TapWorks document-creation software that provides spreadsheet, text processing, graphing and drawing tools. To qualify, Apple must receive point-of-sale mail-back coupons by 10/31/94. Offer expires 9/30/94.

Optima Disk Subsystem + DiskArray Optima Technology is including a free copy of its \$595 DiskArray software, which supports RAID levels 0 and 1, with all of its hard disk subsystems. Existing Optima subsystem owners may obtain DiskArray for \$25 (for S&H) through 12/31/94. Call 714/476-0515 for further information.

StyleScript + Adobe Fonts GDT Softworks is offering three Adobe font packages at close to half their list price (WildType, with 14 fonts, for \$29; Variety Pack, with 20 fonts, for \$29; Value Pack, with 30 fonts, for \$39; or all three packs for \$79) to purchasers of its \$149 StyleScript, which enables Apple Color StyleWriter users to produce true PostScript Level 2 output. Call 800/663-6222 for more information. Offer expires 12/31/94.

COMPETITIVE UPGRADES

addDepth 1.0.2 Ray Dream is offering this \$149 graphics utility for enhancing 2-D images with 3-D effects (Aug 93 ★★★★★) for \$49 to users of Adobe Illustrator, Aldus FreeHand, Aldus PageMaker, or QuarkXPress. Call 800/846-0111 to order. Offer expires 9/30/94.

CD AutoCache CharisMac Engineering is offering this new \$79.95 CD-ROM acceleration software for \$30 to users of any other CD acceleration package such as FWB's CD-ROM Toolkit. Users of CharisMac's CD AllCache may upgrade for \$20. Call 800/487-4420 for more information.

FastPace Instant Contact In addition to offering this new \$79.95 multiuser contact manager at an introductory price of \$29.95, Foresight Technology is encouraging users of competitive products to purchase it for \$19.95. Call 800/701-9393 for more information.

In Control 3.0 Attain Corporation is offering this \$85 personal organizer (Oct 94 ★★★★★) for \$59.95 to owners of other to-do list managers and calendar organizers such as First Things First, Full Contact, and Now Up-To-Date. Call 800/925-5615 to order. Offer expires 10/15/94.

☑ IRMA Workstation 4.0 Digital Communications is offering this \$425 Mac-to-mainframe 3270 terminal-emulation software, which combines support for DCA Netway and MacMainFrame Gateways, for \$125 to owners of competitive products. Call 800/348-3221 for more information.

MacMoney 4.01 Survivor Software is offering this \$89.95 personal-finance program (Jul 94 ★★★★★) to owners of no-longer-published Dollars & Sense for \$45 (plus \$4.50 S&H). MacMoney can import D&S version 4 or 5 transaction and account data. Call 310/410-9527 for more information.

QuickMail 3.0 CE Software is offering this brand-new version of its cross-platform E-mail system to users of competing LAN-based E-mail products for \$12 per user in multi-packs ranging from 5 to 100 users. Call 800/523-7638 to order and for more information. Offer expires 10/31/94.

☑ Vellum 2D 2.5; Vellum 3D 2.5 Ashlar is offering 680X0 and Power Mac versions of its \$2495 Vellum 2D and \$2995 Vellum 3D design and drafting packages to Claris CAD users for \$695 and \$795 (plus \$25 S&H), respectively. Users of Autodesk's Generic CADD can obtain Vellum 2D for \$495. A free graphics translator allows Claris CAD files to be moved over to Vellum, and DXF file compatibility is provided for reading Generic CADD files. Call 800/877-2745 for more information and to order. Offer expires 12/31/94.

☑ WordPerfect 3.1 for Macintosh WordPerfect Corporation is offering this new version of its \$495 word processor (Mar 94 ★★★★★ for version 3.0) to users of any competing product for \$99. Version 3.1 automatically corrects typing errors as they occur and supports QuickDraw GX printing. Order direct (800/321-4566) or through resellers. Call 800/451-5151 for more information.

SPECIAL DISCOUNTS/REBATES

Canvas 3.5 Deneba Software is offering corporate sites a "competitive trade-up" to its \$399 Canvas draw program with cross-platform compatibility (Jan 94 ★★★★★) for \$149.95. A two-hour \$49 training video from MacAcademy is included free of charge. Call 305/596-5644, ext. 2, to order.

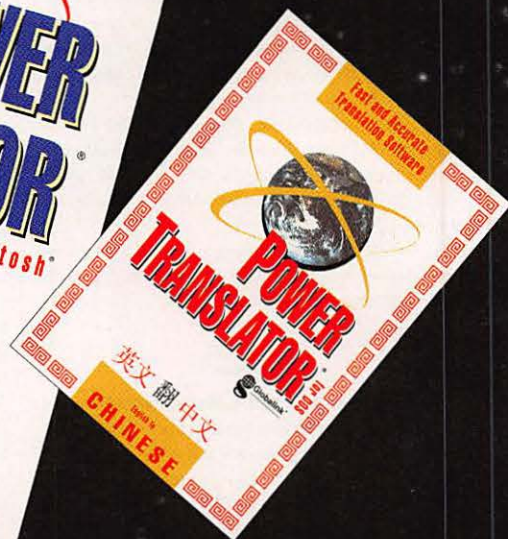
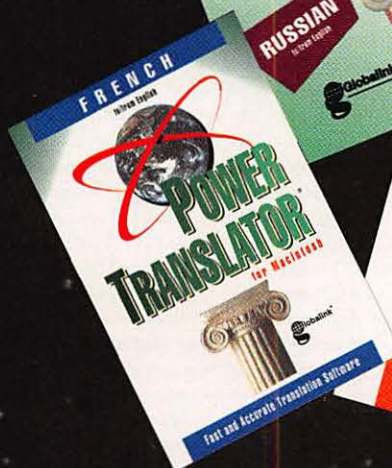
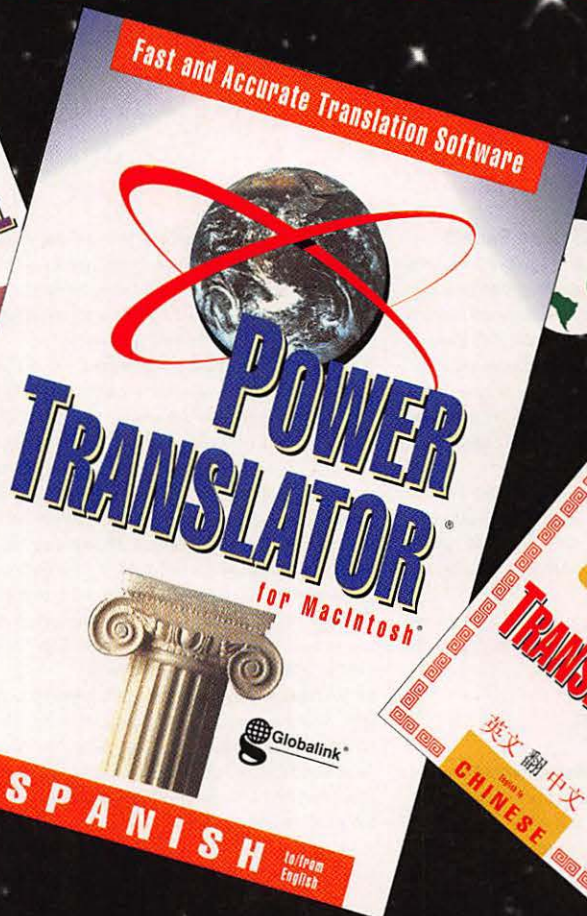
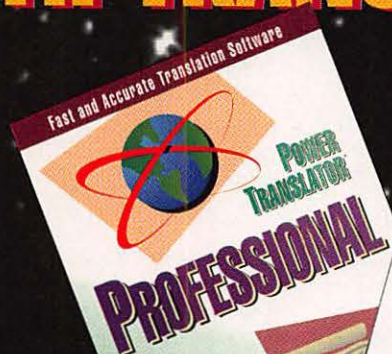
Epson ES-600C Color Scanner Epson is offering a \$100 rebate (effective 9/1/94) on this \$999 scanner, which is bundled with Scantastic's plug-in module and desk accessory plus Adobe Photoshop LE. Call 800/289-3776 for further information. Offer expires 12/31/94.

Media Suite Pro Avid Technology is offering nonprofit groups a special configuration of this desktop video-editing system for \$7999—a 40 percent savings over the regular suggested price. The package includes version 2.2 software (plus a free upgrade to 3.0), a hardware board set, and a 2GB hard drive. Call 800/949-2843 for more information.

Microsoft Works 4.0 Microsoft Corporation is offering a \$20 rebate (via coupon included in product box) on this integrated software package (Feb 93 ★★★★★ for version 3.0) to users of ClarisWorks, Symantec's GreatWorks, and WordPerfect Works. Version 4.0 ships with 32 clip-art images and 12 TrueType fonts. In addition, 75 clip-art images from 3G Graphics will be included while supplies last. Microsoft Works 4.0 is expected to retail for less than \$100. Call 800/426-9400 for more information. **m**

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For faster results just fax this sheet to +1-413-637-4343. Please indicate your fax number where indicated.

Please answer these questions so that we may better serve you.

- A. Including yourself, approximately how many people are employed at your entire work-site (i.e., employees in your office, building, or cluster of buildings)? (Check one.)
- 01 ☐ 1000+
02 ☐ 999 - 100
03 ☐ 99 - 25
04 ☐ Under 25
- B. Which of the following computers are installed at this entire work-site? (Check all that apply.)
- 05 ☐ Apple Workgroup Servers/Mac Quadra-series
06 ☐ Mac Centris-series/II-series/LC III/Performa 600/450/SE 30
07 ☐ Mac LC/LC II/Performa 430/405/400/200/Classic-series/SE/Plus/512K/128K/Portable
08 ☐ Mac PowerBook-series/Duo-series
- C. What is the total number of Macs installed at this entire work-site? (Check one.)
- D. For how many Macintosh computers within this entire work-site do you have purchase involvement for products and/or services? (Check one.)
- | | | |
|-----------|-----------------------------|-----------------------------|
| 500+ | <input type="checkbox"/> 09 | <input type="checkbox"/> 15 |
| 499 - 100 | <input type="checkbox"/> 10 | <input type="checkbox"/> 16 |
| 99 - 50 | <input type="checkbox"/> 11 | <input type="checkbox"/> 17 |
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| 9 - 1 | <input type="checkbox"/> 13 | <input type="checkbox"/> 19 |
| None | <input type="checkbox"/> 14 | <input type="checkbox"/> 20 |
- E. In which ways are you ever involved in purchase decisions for Macintosh products at this entire work-site? (Check all that apply.)
- 21 ☐ Initiate/Determine need for product/capabilities/features
22 ☐ Evaluate, recommend, or approve brands/models
23 ☐ Evaluate, recommend, or approve purchase source
24 ☐ Authorize purchases
- F. Over the next 12 months, how much will this entire work-site spend on Macintosh products and/or services? (Check one.)
- 25 ☐ \$1 million or more
26 ☐ \$999,999 - \$500,000
27 ☐ \$499,999 - \$100,000
28 ☐ \$99,999 - \$50,000
29 ☐ \$49,999 - \$10,000
30 ☐ Under \$10,000
- G. Considering the entire work-site, which of the following Macintosh hardware and software products are currently installed? (Check all that apply.)
- 31 ☐ Business software (Word processing, spreadsheet, database, etc.)
32 ☐ Graphics/publishing software
33 ☐ Monitors/displays
34 ☐ Printers/scanners
35 ☐ Networking/communications hardware and/or software
36 ☐ Multimedia/AV hardware and/or software
37 ☐ Mobile computing products (PowerBooks, peripherals, software, etc.)
- H. What is your primary job function? (Check one.)
- 38 ☐ Computer Reseller/VAR/VAD
39 ☐ MIS/DP/IS/Network Management
40 ☐ Engineering
41 ☐ R&D/Scientific
42 ☐ Corporate/General Management
43 ☐ Accounting/Finance
44 ☐ Marketing/Sales/PR/Communications
45 ☐ Art/Design/Creative Services

Thank You!

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\$309 62564
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DeskWriter 310 Sheet Feeder	60749
Black Ink Cartridge for DeskWriter 310	63511
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\$2249⁹⁹ 61618

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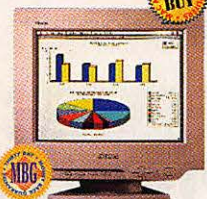
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SONY



Multiscan 15sf

Trinitron Digital Control Color Monitor



Adapter Required

\$459 65159

- 15" Digital Multiscan® computer display with 14.0" maximum diagonal viewable area
- Trinitron® technology delivers bright images and vibrant colors
- 25mm Aperture Grille pitch
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- New design features simple control buttons and minimizes footprint
- Includes color temperature control

Multiscan 17sei

Trinitron Digital Control Color Monitor



Adapter Required

\$999 62940

- 17" Trinitron CRT with 16.1" maximum diagonal viewable area
- 25mm Aperture Grille pitch
- Bonded anti-reflective panel
- Maximum refresh rate at 1024x768 at 100Hz
- EPA Energy Star and MPR II compliant
- New design features simple front panel control buttons



Multiscan 20se

Trinitron Digital Control Color Monitor

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- 30mm Aperture Grille pitch
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- Supports resolutions up to 1600x1200 at 60Hz
- Vertically flat screen and anti-reflective panel to maximize viewability by minimizing glare
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- 3 year parts and labor and 2 year CRT warranty



Adapter Required

\$1949 65677

MacView Sony to Mac Adapter \$18⁹⁹ 63667

Sony to Mac Adapter 640x480 \$16⁹⁹ 60426

Magnavox

14" Color Monitor (CM2080) \$269⁹⁹ 61905

15" Color Monitor (CM4015) \$389⁹⁹ 65161

Philips

Brilliance 1520AS 15" color \$469⁹⁹ 64189

17" Trinitron Display \$869⁹⁹ 65162

Texas Instruments

microLaser Pro 600 PS23 \$1399⁹⁹ 63380

microLaser Pro 600 PS65 \$1589⁹⁹ 64611

microWriter PS23 \$709⁹⁹ 64612

microWriter PS65 \$844⁹⁹ 64613

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Tahoe 230MB Optical Drive \$958⁹⁹ 65154

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- 28 mm dot pitch
- Digital (one touch) picture controls
- Tilt-swivel base

\$299 64990

SyncMaster™ 15GL 15" Color Monitor

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- 28 mm dot pitch
- Digital (one touch) picture controls
- Tilt-swivel base

\$379 64991 Includes Mac Adapter

SyncMaster™ 17GL 17" Color Monitor

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- 28 mm dot pitch
- INVAR shadow mask
- Tilt-swivel base

\$719 64989

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BTI Slim Pack

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\$148⁹⁹ 64536



SlimPack for Duo

SlimPack for the PowerBook is an external zero footprint (11"x6.5"x0.5") battery that weighs approximately 2.5 lbs. SlimPack is maintenance free and has no memory effect. It powers Macintosh Duo 210 to 280c up to four times longer than Apple's original internal batteries. Five-light LED charge indicator and comes with its own adapter for recharging.

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Compatible with 140 to 180c models. 3.1 Ah capacity. LED indicator. Protective cap over quality gold-plated contacts. Quick-lock design. 5 LED charge indicator. Six months warranty

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RapidCharger for PowerBook Duo

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Mini AC Adapter for PowerBook **\$59⁹⁹** 65529

Mini AC Adapter for Duo **\$59⁹⁹** 65530

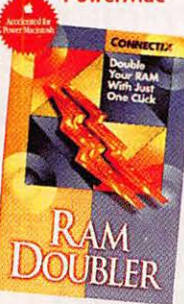
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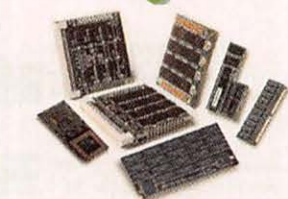


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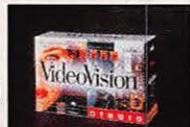
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MultiSync 5FGp 17" Color Monitor .. \$1179⁹⁹ 62915

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MultiSync 660AV, 840AV Adapter, 1024x768 MAC AV

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PowerBook to NEC Fg Monitor 64198

RELISYS

AVEC 2400

Color Scanner

The AVEC Color 2400 Mac is a scanner which maximizes the desktop personal computer into a working imaging tool. It is a three pass design, capable of scanning a 8 1/2"x14" area in 24-bit, 16.8 million colors with a maximum resolution of 2400 dpi. This translates into 180,000 pixels per square inch, a true benefit for image scanning. Bundled with Adobe Photoshop LE and OmniPage Direct OCR software, the AVEC 2400 has everything you need in an entry level color scanner with three times the specifications of the competition at a lower cost. SCSI-2 interface.

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RELI 2412 Mac/T

Color Scanner with Transparency Option

The Reli 2412 Mac/T is an excellent choice for the desktop publisher. It is of a single pass design, capable of scanning a 24-bit 8 1/2" x 14" 16.8 million color image with a maximum resolution of 2400 dpi. The Reli 2412T's maximum optical resolution translates into 360,000 pixels per square inch, which benefits anyone scanning color images and transparencies. Bundled with Adobe Photoshop LE image processing and OmniPage Direct OCR software.

RELI 9624

Professional Color Scanner with Transparency Option

The Reli 9624 is a scanning tool ideal for PrePress use and the graphics professional. It is of a single pass design, capable of scanning a 24-bit 8 1/2" x 17" 16.8 million color image with a maximum of 9600 dpi. The Reli's 9624's maximum optical resolution translates into 1,440,000 pixels per square inch. Includes a transparency adapter for up to 4"x9" transparencies. Bundled with Adobe Photoshop image processing and OmniPage Direct OCR software.

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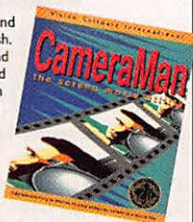
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The Screen Recording Utility for Developers, Trainers, and Educators

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- Simultaneous recording of screen activity, Macintosh system sounds and voice overs
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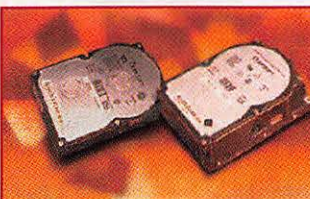
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Favorite Artist Matisse

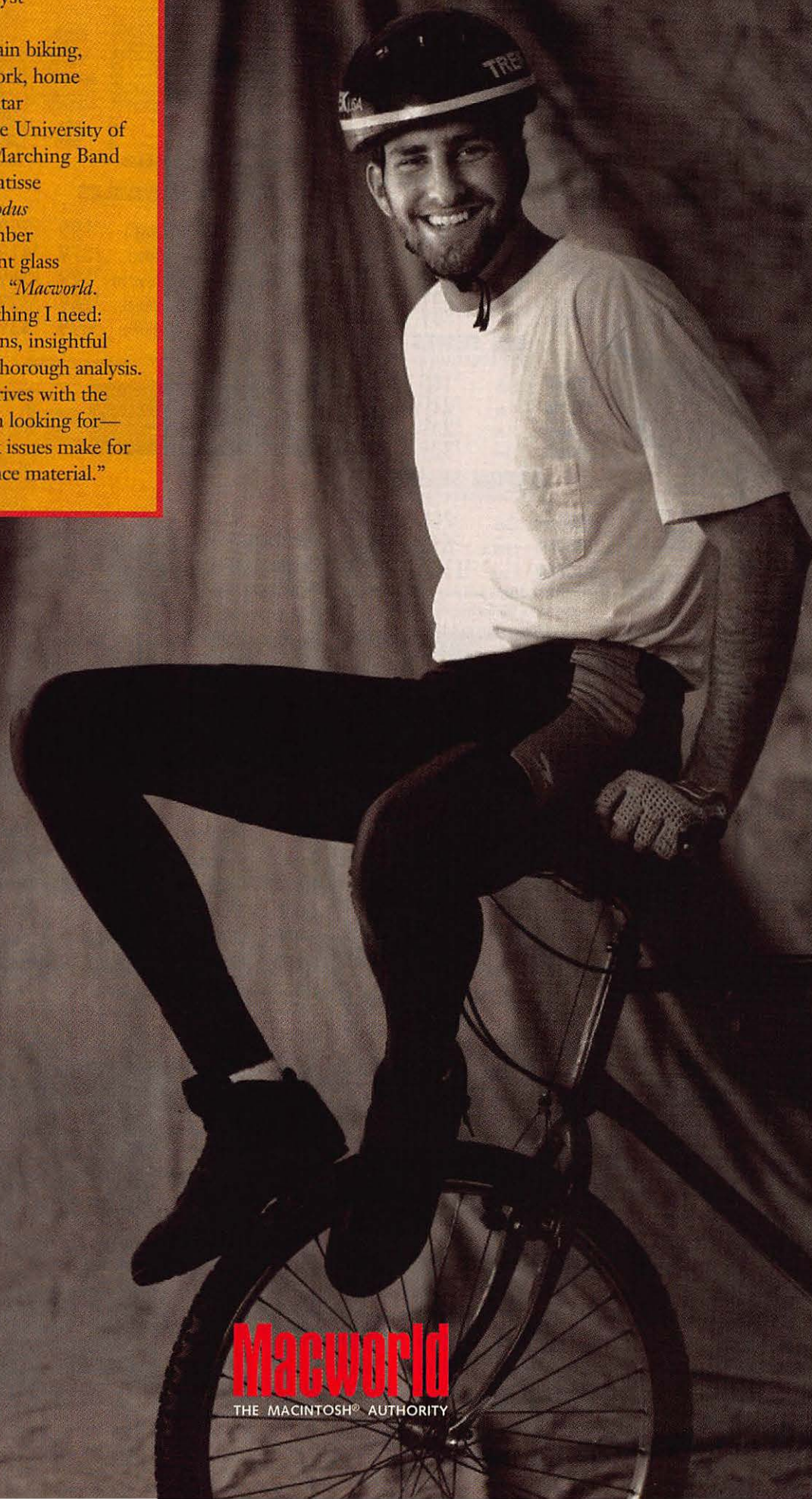
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Unformatted Capacity	Model	Description	Access Time	Actual MAC Capacity	Internal	External
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2.1GB	ST12400N	Hawk 2	9ms	2000mb	\$1299	\$1359
4.3GB	ST15230N	Hawk 4	9ms	4000mb	\$2139	\$2199
1.7GB	ST11950N	Barracuda 1	8ms	1350mb	\$1439	\$1499
2.1GB	ST12550N	Barracuda 2	8ms	2050mb	\$1449	\$1509
4.3GB	ST115150N	Barracuda 4	8.5ms	4000mb	\$2489	\$2549
5.25" FULL HEIGHT						
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MultiSpin 3Xe (External, 195ms access time, 450KB/sec data transfer)	\$469	\$569
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CLUBMAC REMOVABLES

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2.0GB	HP DAT	DDS	60m, 90m	\$939	\$989
2-4GB	HP DAT/DC	DDS-DC	60m, 90m	\$1049	\$1099
4-8GB	HP DAT/2	DDS-2	60m, 90m, 120m	\$1319	\$1369
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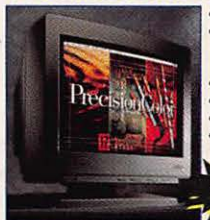
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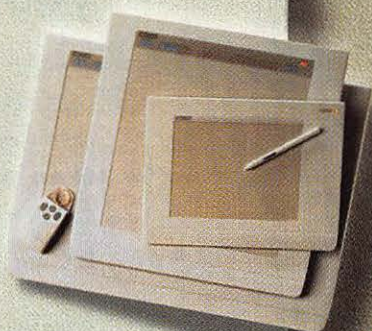
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CAPACITY	DESCRIPTION	INTERNAL	EXTERNAL
Quantum 540MB	ONLY \$395		

CAPACITY	DESCRIPTION	INTERNAL	EXTERNAL
G0256MB	2.5" NB 17ms	\$335	\$435
42 MB	3.5" LP 17ms	\$109	\$169
85MB	3.5" LP 17ms	\$130	\$190
170MB	3.5" LP 17ms	\$195	\$255
240MB	3.5" LP 10ms	\$235	\$295
270MB	3.5" LP 10ms	\$255	\$315
340MB	3.5" LP 10ms	\$275	\$335
540MB	3.5" LP 10ms	\$395	\$455
1000MB	3.5" HH 10ms	\$715	\$775
1400MB	3.5" HH 9.5ms	\$905	\$965
2100MB	3.5" HH 9.5ms	\$1235	\$1295

Seagate 4000MB ONLY \$2485

CAPACITY	DESCRIPTION	INTERNAL	EXTERNAL
1200MB	3.5" HH 10.5ms	\$865	\$925
2100MB	Hawk 2, 8ms	\$1145	\$1205
2400MB	Barracuda 2, 8ms	\$1655	\$1715
2400MB	3.5" HH 10.5ms	\$1465	\$1525
3400MB	5.25" FH 11ms	\$2085	\$2185
4000MB	3.5" HH 9ms	\$2485	\$2545
9000MB	5.25" FH 11ms	\$3735	\$3835

OPTICAL DRIVES

MODEL	CAPACITY	SEEK	MACKIT
dsc-650	594/650MB	40ms	\$1199
Ricoh-9200 EX	594/650MB	35ms	\$1849
MaxOptix-Tahiti II	594/1GB	25ms	\$2299
MaxOptix-Tahiti III	650/1GB	25ms	\$2799
Sony-650	594/650	19*ms	\$1899
PMO-1.3GB	650/1.3GB	19*ms	\$2799
Sony 1.3GB	650/1.3GB	25ms	\$2299

3.5" OPTICAL DRIVES PANASONIC 128MB \$689

MODEL	CAPACITY	SEEK	MACKIT
Panasonic	128mb	35ms	\$689
Fujitsu-230	230mb	30ms	\$899
Sony P-301	128mb	35ms	\$999
Most-256	128/256mb	37ms	\$895

All optical drive prices include external drive, 25/50 SCSI Cable, Mac software and terminator.

5.25" CARTRIDGES	PRICE
dsc /3M /Sony 650MB	\$79/99/119
Sony 1.3GB	\$139

3.5" CARTRIDGES	PRICE
dsc 128MB/Sony 128MB/Komag 230	\$29/45/49

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 - ★ Storage
 - ★ Alternative Storage
- Macworld 1993 World-Class Awards:
- ★ APS Hard Drive Series
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- ★ Best Technical Support
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Regulates SCSI Line Voltage	✓
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- ◆ StackKIT Includes Four Concave Stacking Feet
- ◆ StackKIT Includes Exclusive APS SCSI "C" Connector

APS HARD DRIVES

For your Mac or Power Mac

Model	Capacity	Internal	SR2000
-------	----------	----------	--------

163MB - 1003MB

APS MX 290 ²	276MB	\$199	\$299
Maxtor 7290 mechanism			
APS Q 340 ²	327MB	279	379
Quantum 340 mechanism			
APS I ^{mr} 360 ²	342MB	299	399
IBM DSAS 3360 mechanism			
APS I ^{mr} 540 ²	522MB	399	499
IBM DSAS 3540 mechanism			
APS Q 540 ²	516MB	399	499
Quantum 540 mechanism			
APS I ^{mr} 720 ²	700MB	499	599
IBM DSAS 3720 mechanism			
APS MS1.2AV ⁵	965MB	759	859
Micropolis 2210AV mechanism			
APS MS1.2 ⁵	1001MB	699	799
Micropolis 2210 mechanism			
APS I ^{mr} 1.0 ⁵	1003MB	699	799
IBM 0662 mechanism			
APS MS 4110 ⁵	1002MB	699	799
Micropolis 4110 mechanism			

Model	Capacity	Internal	SR2000
-------	----------	----------	--------

1029MB - 2845MB

APS Q 1080 ²	1029MB	\$749	\$849
Quantum 1080S mechanism			
APS MS 1.7AV ⁵	1612MB	999	1099
Micropolis 2217AV mechanism			
APS MS 1.7 ⁵	1682MB	929	1029
Micropolis 2217S mechanism			
APS I 2.0 ⁵	1920MB	1299	1399
IBM 0664 mechanism			
APS ST 2.0 ⁵	2040MB	1549	1649
Seagate ST 12550N Barracuda mech.			
APS MS 2.4G ⁵	2100MB	1349	*1549
Micropolis 1924 mechanism			
APS MS 3.0G ⁵	2845MB	1999	*2199
Micropolis 1936 mechanism			
APS ST 4.0 ⁵	4294MB	2799	2899
Seagate ST 15150 mechanism			
APS ST 9.0 ⁵	8673MB	4149	*4349
Seagate ST410800N mechanism			

1-5 Denotes length of manufacturer's warranty
* External Case is Special Full Height Only
* Internal Price Listing

Internal drives for Quadra 800 and Centris 610 available.
DaTerm™ patent pending
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POWERBOOK DRIVES

Model	Capacity	LW Pro 630	Internal	Companion II
APS PB 85 ¹	80MB	\$249	—	AC/DC
APS PB 170 ¹	160MB	249	\$199	\$349
APS T 213 ¹	202MB	319	269	419
APS PB 250 ¹	240MB	349	299	449
APS T 340 ¹	324MB	549	499	649
APS T 520 ¹	500MB	699	599	749

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Companion II Enclosures	AC	AC/DC
Enclosure	\$89	\$139

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216 October 1994 MACWORLD



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APS HyperDAT

If you need high-speed backup (not the kind that ties your server up and slows down your network), you need the DDS-2 power of the APS HyperDAT! Back up locally at rates as high as 28MB per minute! Pack up to 10GB on a single tape! Best of all, your regular DDS and DDS compression tapes can be read in the APS HyperDAT, too!

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The amazing APS DAT offers you great performance and reliability. Get up to 2.0GB on a 90 meter tape with backup speeds as high as 10MB per minute.

All APS DATs Include Retrospect, a \$139 Value, Free!

Model	Capacity*	Internal	SR 2000
APS DAT ²	1.8-2G on 90m tape	\$749	\$799
APS Turbo DAT ²	4-5G on 90m tape	949	999
APS HyperDAT ¹	8-10G on 120m tape	1149	1199

*Actual data compression and tape capacity vary greatly depending on the type of data recorded, other system parameters and environment.

DAT Media (Units)	1-4	5-19	20+
60 meter DAT Tapes —	\$10	\$9.50	\$8.50
90 meter DAT Tapes —	12	11.50	10.50
120 meter DAT Tapes —	23	22.50	21.50

All APS DAT Drives Include Retrospect by Dantz & 1 FREE DAT Tape

Model	SR 2000
APS T 4101	\$299
APS T 3401	439

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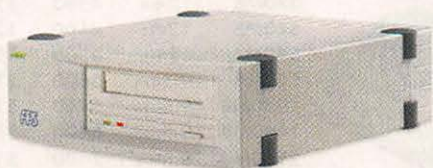
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* 30-day money back guarantee (excluding opened software). Your risk is the cost of shipping.
† Drive for Drive Replacement Warranty: The warranty length is limited by the superscript number next to each drive model.
‡ APS will not be responsible for any product loss or damage to be determined according to the terms of the product's warranty.
§ All prices and specifications are subject to change without notice.
|| Based on drive model and configuration.
¶ Hard drives include formatters, cables, and IDE required to operate with the specified Macintosh when applicable. All hard drives from APS Technologies come preformatted with Apple's System 7.1.1 software, at least 9MB of compacted publicly-distributable software, and APS Technologies' APS POWERBOLLS™ SCSI format utility.
‡ All internal drive products and cases come with a premium 25 x 50 x 70 SCSI Cables. Comparison drives, (not cases) include a 30 x 80 PowerBook SCSI cable.
§ International customers must pay for shipping charges.
|| All drive technical support is provided. Regular hours are 9am to 5pm Monday thru Friday, 9am to 5pm Saturday Central Time.

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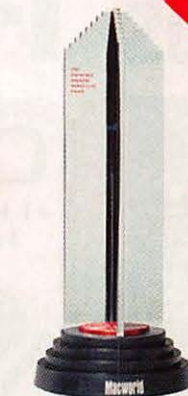


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1994 Macworld Magazine World Class Award - Alternative Storage The APS DAT

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— Editors of MacUser



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APS 44MB SQ 555

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SYQUEST

APS SQ 555 ²	44MB	\$259
APS SQ 5110 ²	44/88MB†	429
APS SQ 5200 ²	200MB††	499
APS SQ 3105 ¹	105MB	329
APS SQ 3270 ¹	270MB	499

† Does not format 44MB cartridges
†† Does not format 44MB & 88MB cartridges
All SyQuest Drives Include 1 FREE Cartridge

SyQuest Media	1-4	5-19	20+
44MB cartridge —	\$59	\$58	\$57
88MB cartridge —	79	77	76
200MB cartridge —	89	87	86
105MB cartridge —	59	57	56
270MB cartridge —	69	67	66

Prices listed are for unformatted media.

MAGNETO OPTICAL

Model	Internal*	SR 2000
APS 128MB MO ¹	\$629	\$729
APS 230MB MO ¹	899	999
APS 1.3Gig MO ¹	2399	2499

All MO Drives Include 1 FREE Cartridge

MO Media (unformatted)	1-4	5-19	20+
128MB cartridge —	\$45	\$44.50	\$43.50
230MB cartridge —	60	59	57
1.3Gig cartridge —	123	121	120 (1024KB)

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APS SCSI DOC w/ PowerMerge Lite \$39

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- High quality Japanese made hard drives!
- 3yr Warranty on 530MB, 5yr Warranty on 1080MB
- Low price guarantee!

Capacity	Internal	External
530MB	\$339	\$399
1080MB	\$639	\$699

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- High performance optical drives.
- Ask for your free "Dare to Compare" specification brochure.
- Includes SCSI Manager 4.3 compliant driver, cables, and 1 free disk.

Capacity	Model	Internal	External
128MB	SS5128	\$649	\$699
230MB	SS5230	\$849	\$899
1.3Gig	SS51300	\$2199	\$2269

PIONEER CD ROM CHANGERS

- FREE FEDERAL EXPRESS 2 DAY AIR (within continental US, expires 10/31/94)
 - No more changing disks over and over.
 - Low price guarantee on Pioneer!
 - Requires only 1 SCSI ID number.
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| DRM602X, 6 Disc, Double Speed | \$899 |
| DRM604X, 6 Disc, Quad Speed | \$1159 |
| DRM1804X, 18 Disc, Quad Speed | \$2099 |

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- New AV series hard drives are specifically designed for enhanced digital video and audio performance in applications such as multimedia, desktop publishing, and video editing.
 - We will beat any advertised Micropolis price.
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| 1000MB | MC4110AV | \$749 | \$819 |
| 1700MB | MC2217AV | \$989 | \$1059 |
| 3000MB | MC1936AV | \$2059 | \$2179 |

Quantum

#1 HARD DRIVE FOR MAC!



Capacity	Speed	RPM	Buffer	Wty	Model	Internal	External
170MB	17ms	3600	32K	2yr	ELS170S	\$179	\$239
270MB	12ms	4500	128K	2yr	LPS270S	\$229	\$289
340MB	12ms	4500	128K	2yr	LPS340S	\$275	\$335
540MB	12ms	4500	128K	2yr	LPS540S	\$329	\$389
540MB	9.5ms	5400	512K	5yr	EMP540S	\$509	\$569
1080MB	9.5ms	5400	512K	5yr	EMP1080S	\$669	\$729
1440MB	9.5ms	5400	512K	5yr	EMP1440S	\$879	\$939
2160MB	9.5ms	5400	512K	5yr	EMP2160S	\$1179	\$1239

MegaHaus is your #1 source for Quantum drives.

- Low price guarantee on all Quantum Drives!
- Same day shipping on most orders!



SyQuest

Genuine Syquest Media Qty 5 or w/ purchase	Capacity	Speed
44MB	\$59	
88MB	\$68	
105MB	\$56	
200MB	\$79	
270MB	\$69	

Capacity	Speed	Compatible	Model	Buffer	Internal	External
88MB	20ms	44, 88MB	SQ5110C	32K	\$359	\$415
105MB	14.5ms	105MB	SQ3105S	64K	\$265	\$329
200MB	18ms	44,88,200MB	SQ5200C	64K	\$449	\$519
270MB	13.5ms	105, 270MB	SQ3270S	128K	\$429	\$489

MegaHaus is your #1 source for Syquest drives.

- Low price guarantee on all Syquest drives!
- 1 FREE cartridge with each drive!
- 2 year warranty on drive and case!
- 5 year warranty on all cartridges!
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HARD DRIVES

Capacity	Speed	RPM	Buffer	Brand	Warranty	Internal	External
240MB	14ms	4500	256K	Fujitsu	1 Year	\$299 (2.5" for Powerbook)	
530MB	13.8ms	4500	256K	Fujitsu	3 Years	\$339	\$399
720MB	12ms	4500	192K	IBM	2 Years	\$479	\$539
1052MB	8.5ms	5400	256K	Micropolis	5 Years	\$669	\$729
1080MB	9.5ms	5400	256K	Fujitsu	5 Years	\$639	\$699
1750MB	10ms	5400	256K	Micropolis	5 Years	\$909	\$969 BEST BUY!
2040MB	9.2ms	5400	512K	IBM	5 Years	\$1249	\$1299
1455MB	8ms	7200	1024K	Seagate	5 Years	\$1399	\$1499
2148MB	9ms	5400	512K	Seagate	5 Years	\$1259	\$1349
3020MB	11ms	5400	256K	Micropolis	5 Years	\$1959	\$2029
4250MB	11ms	5400	1024K	IBM	5 Years	\$2239	\$2339
4290MB	9ms	5400	1024K	Seagate	5 Years	\$2249	\$2349
4290MB	8ms	7200	1024K	Seagate	5 Years	\$2399	\$2499
9100MB	10ms	5400	256K	Micropolis	5 Years	\$3999	\$4099

Includes formatting software and cables. We stock multiple bay enclosures for custom configurations.

CD ROM DRIVES

Brand	Model	Speed	Transfer	Buffer	Internal	External
Toshiba	XM3401	200ms	330KB/sec	256K	\$299	\$369 BEST BUY!
NEC	CDR510	195ms	450KB/sec	256K	\$419	\$449
Plexor	4PLEX	150ms	600KB/sec	1MB	\$549	\$609

Includes driver software with music play, \$25 Photo CD processing coupon, and cables. Multi Drive CD Towers in stock!

TAPE DRIVES

Capacity	Type	Brand	Internal	External	Capacity	Type	Brand	Internal	External
250MB	QIC 150	Archive	\$459	\$529	4-8Gig	DDS DAT	Conner	\$939	\$999
580MB	MiniCart	Teac	\$539	\$599	4-8Gig	DDS DAT	HP	\$1029	\$1079
.75-1.5Gig	MiniCart	Exabyte	\$589	\$649	4-10Gig	DDS2 DAT	Sony	\$1079	\$1139
2Gig	DAT	Conner	\$819	\$869	4-10Gig	DDS2 DAT	Conner	\$1069	\$1129
2Gig	DAT	HP	\$929	\$979	4-10Gig	DDS2 DAT	HP	\$1299	\$1349

Includes Retrospect 2.1, 1 tape, and cables. OPTIMA DeskTape Software mounts DAT on desktop \$289.

OPTICAL DRIVES

Capacity	Speed	Brand	Cache	External	Capacity	Speed	Brand	Cache	External
1.3Gig	23ms	HP	512K	\$2399	1.3Gig	19ms	Maxoptix	4MB	\$2489

Includes formatting software, 1 disk, and cables. 230MB Fujitsu and 650MB HP models also in stock.



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HARD DRIVES

CONNER 1GIG EXTERNAL \$699

5 YEAR WARRANTY

FUJITSU

CAPACITY	SIZE	ACCESS	INTERNAL	EXTERNAL
240MB*	2.5"	14MS	\$ 315	\$ 375
1.2GIG	3.5"	8.5MS	\$ 695	\$ 755

Seagate

5 YEAR WARRANTY

CAPACITY	SIZE	ACCESS	MODEL	EXTERNAL
1.2GIG	3.5"	9MS	ST31200N	\$ 715
2.4GIG	3.5"	9MS	ST12400N	\$ 1315
2.5GIG	3.5"	8MS	Barracuda 2	\$ 1440
2.5GIG	3.5"	8MS	Barracuda 2 WIDE	\$ 1499
3.4GIG	5.25"	10MS	Elite 3	\$ 1999
4.1GIG	3.5"	8MS	BARRACUDA 4	\$ 2335
9.0GIG	5.25"	11MS	Elite 9	\$ 3995

CONNER

5 YEAR WARRANTY

CAPACITY	SIZE	ACCESS	MODEL	EXTERNAL
330MB**	3.5"	12MS	CFA340S	\$ 320
545MB**	3.5"	12MS	CFA540S	\$ 450
1.0GIG	3.5"	9MS	CFP1060S	\$ 699

Quantum

5 YEAR WARRANTY

CAPACITY	SIZE	ACCESS	MODEL	EXTERNAL
1.0GIG	3.5"	9MS	E1080S	\$ 770
2.2GIG	3.5"	9.5MS	E2160S	\$ 1280

HITACHI

5 YEAR WARRANTY

CAPACITY	SIZE	ACCESS	INTERNAL	EXTERNAL
3.7GIG	5.25"	12.8M	\$ 1845	\$ 1945

MONITORS

CD ROMS

Sony GDM-17SE1 17"	\$ 1059	Toshiba 4101	\$ 275
Sony GDM-20SE1 20"	\$ 1899	Toshiba 3401	\$ 365
RasterOps Horizon 24	\$ 2259	Sony CDU-561	\$ 385
RasterOps Paintbd Turbo	\$ 1159	Ricoh 1000	\$ 3250
RasterOps 8XL	\$ 459	RECORDABLE CD—MAKE YOUR OWN!	
RasterOps Li	\$ 339		

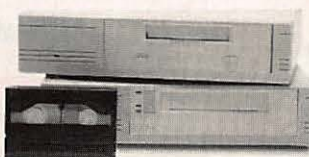


OPTICAL DRIVES

128MB EXTERNAL \$599

1 YEAR WARRANTY

CAPACITY	MODEL	ACCESS	EXTERNAL
128MB	Ricoh	30MS	\$ 599
230MB	Fujitsu	30MS	\$ 945
230MB	Olympus	28MS 4200 RPM	\$ 915
650MB	Sharp	40MS	\$ 1699
1.3GB	Ricoh	40MS	\$ 1999
1.3GB	Sony	40MS	\$ 2099

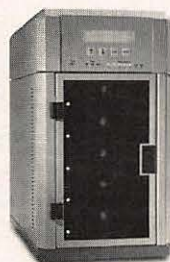


TAPE BACKUP SYSTEMS FROM \$499

INCLUDES TAPE + RETROSPECT SOFTWARE

2 YEAR WARRANTY

CAPACITY	MODEL	MEDIA	INTERNAL	EXTERNAL
250MB	Tandberg TDC 3660	DC6250	\$ 445	\$ 499
520MB	Tandberg TDC 3660	DC6250	\$ 565	\$ 625
1.3-2GIG	Archive 4320*	4MM	\$ 739	\$ 799
1.3-8GIG	Archive Turbo*	4MM	\$ 939	\$ 999
4.0-8GIG	Connor 4326 DDS-2	4MM	\$ 1089	\$ 1149
4.0GIG	Sony 5200 DDS-2	4MM	\$ 989	\$ 1049
4.0-8GIG	Sony 5000 DDS-2	4MM	\$ 1129	\$ 1189
1.3-5GIG	Exabyte 8205	8MM	\$ 1539	\$ 1599
1.3-10GIG	Exabyte 8505	8MM	\$ 2179	\$ 2279



RAID SYSTEMS FROM \$1399

1.0 GIG RAID	\$ 1399
2.0 GIG RAID	\$ 1999
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* Fastest RAID for Video Vision Users.

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60M Tape	\$ 10	128MB Optical	\$ 28
90M Tape	\$ 12	230MB Optical	\$ 35
112M Tape	\$ 18	650GIG Optical	\$ 79
120M Tape	\$ 22	1.3GIG Optical	\$ 105





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 • Up to 2700dpi
 • 24 bit color or monochrome
 • Includes Nikon scan software and Photoshop plug-in
 Nikon #06926

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04042	Photoshop 3.0	\$544.98
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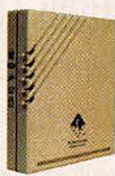
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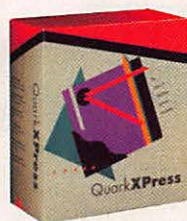
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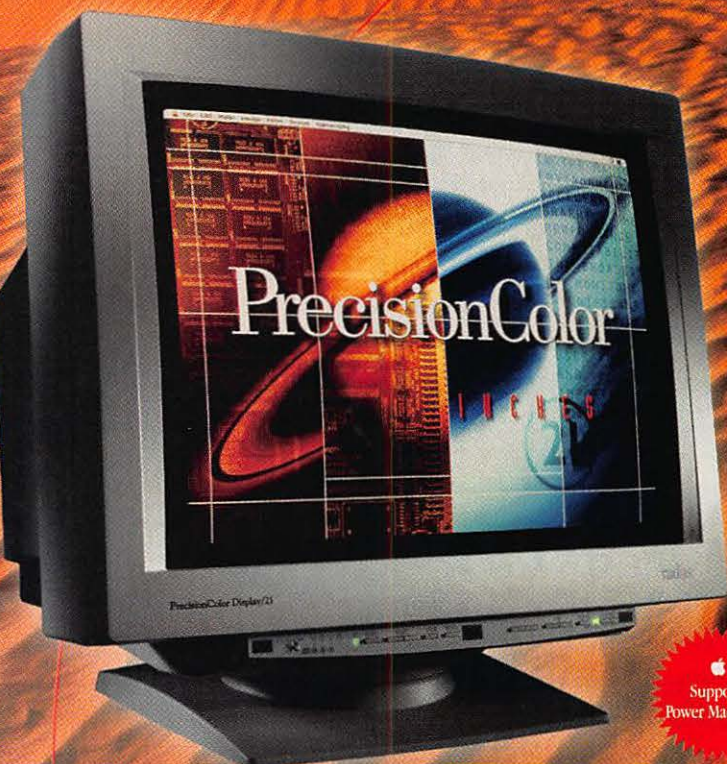
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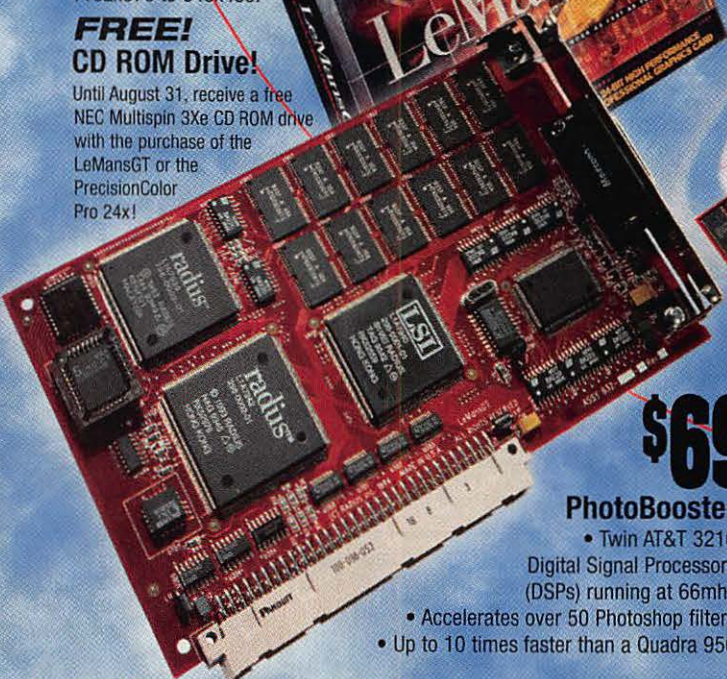
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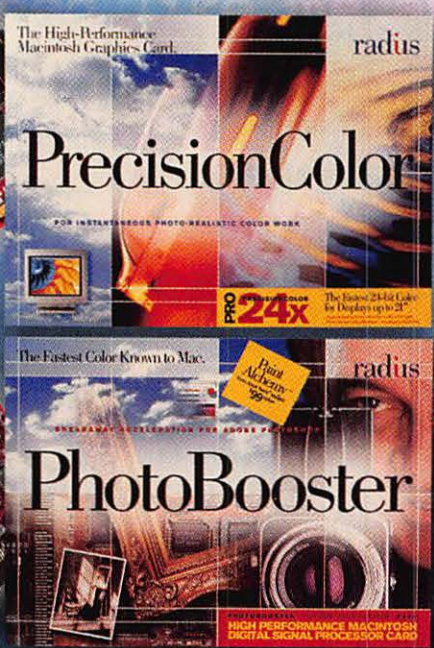
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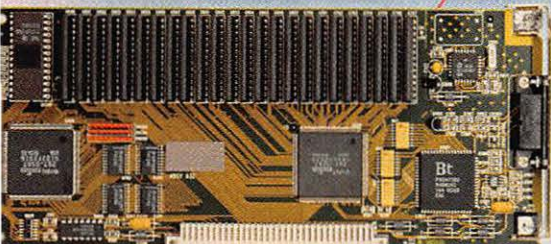
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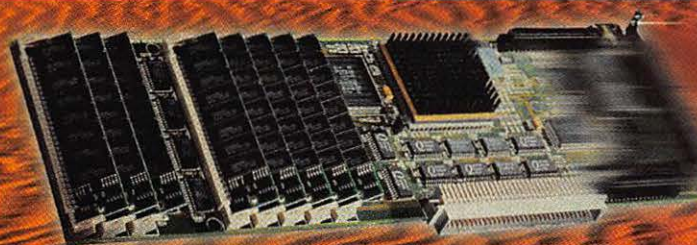
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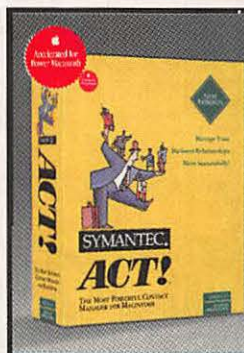
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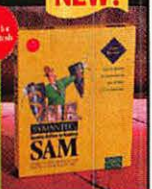
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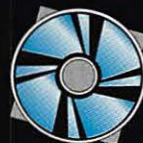
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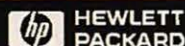
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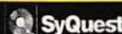
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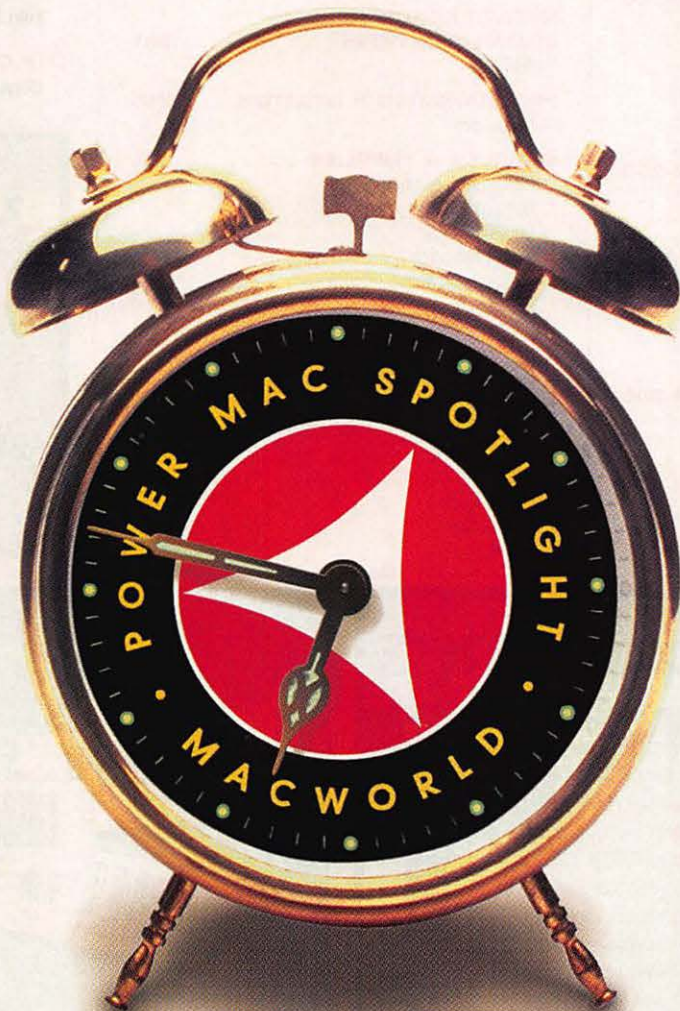
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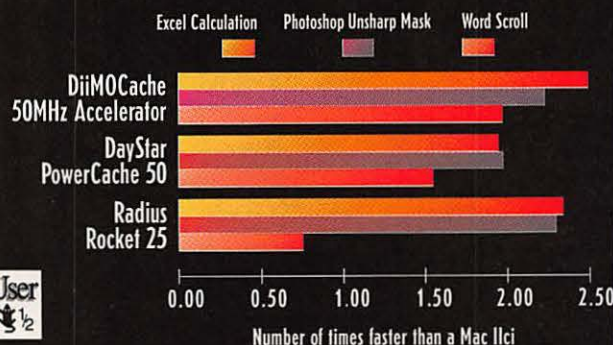
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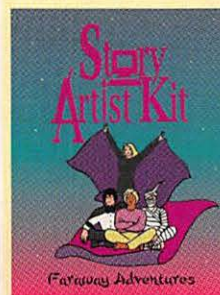
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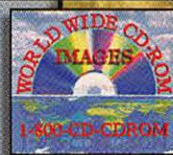
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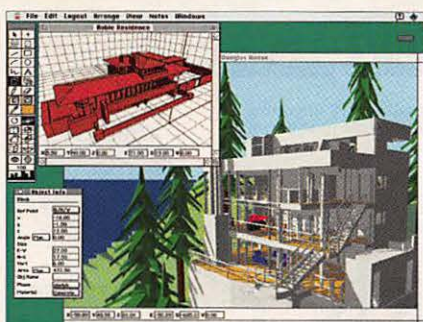
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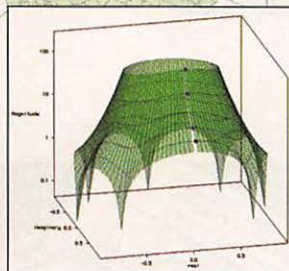
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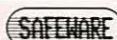
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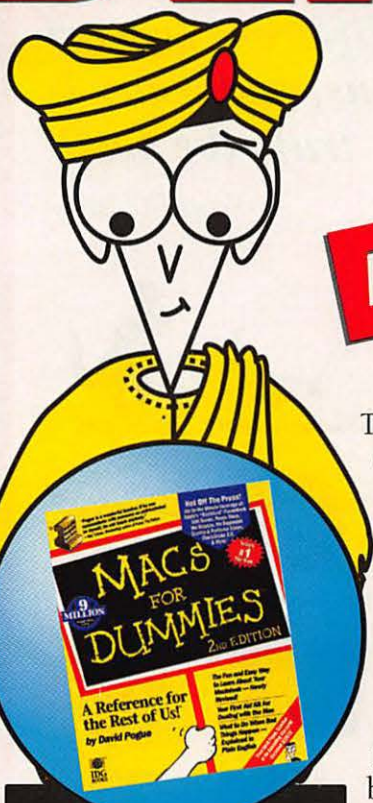
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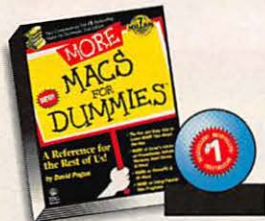
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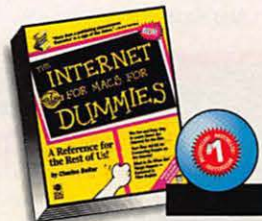
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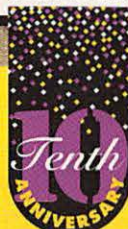
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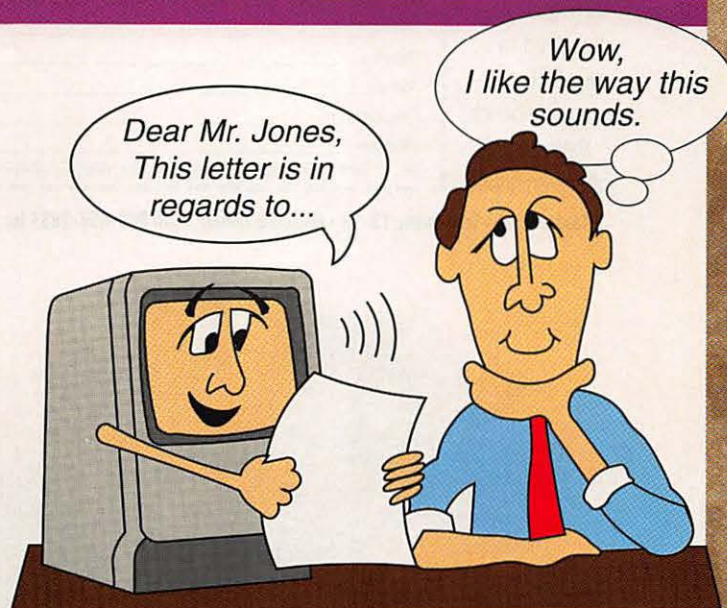
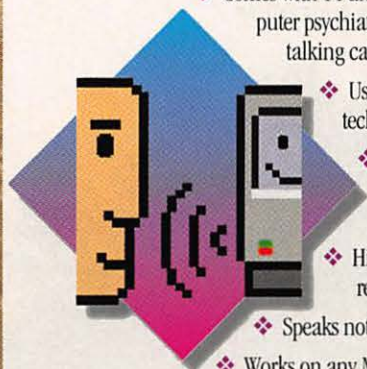
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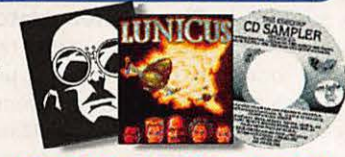
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WISE GUY

BY GUY KAWASAKI

User Group Correction

How to give good meeting—and get good demo

YOU CAN COUNT ON ONE hand the factors that have made Macintosh a success. User groups, those bands of merry mavens who provided support when Apple wouldn't because it couldn't see how doing so would increase the current quarter's earnings, are definitely on this short list.

For most members of user groups, the primary value of joining is in attending a monthly meeting where developers demonstrate their wares (and often their ineptitude). Because the quality of these meetings is crucial to the survival of user groups—and the survival of user groups is crucial to the survival of Apple—I'd like to help the meetings be all they can be.

The Hardware

The second-most important determinant of the quality of a user-group meeting is the kind of equipment that the demonstrator uses. (The most important is the quality of the pizza after the meeting.)

A Quadra or Power Macintosh with a color projector or LCD panel is de rigueur, because the complexity of current software and the sloppiness of today's cross-platform, team approach to programming makes watching a demo on a slow machine worse than listening to Mike Spindler announce a new product.

Speaking of equipment, another important consideration is having some kind of microphone and speaker system. It's a real problem when you can't hear the demonstrator at a meeting—if for no other reason than you miss the faux pas of representatives from big, dumb Windows companies.

The Agenda

Most meetings begin with ten people taking 30 minutes to explain where and when their special-interest groups (SIGs) are meeting. In all the meetings I've attended, I have yet to see anyone take notes during these announcements. This leads me to believe that either the people who care have the information already, or no one cares.

Starting with SIG announcements slows the pace of the meeting and forces the demonstrator to pick it back up. In my case, frankly, this is not a problem. But most demonstrators struggle to raise the energy of the room as if they were carrying a Macintosh Portable through O'Hare. Of course, many demonstrators are bozos, but then bozos need a primed audience more than anyone.

I suggest that an area in the lobby be designated for posting SIG announcements. A meeting should blast off: a short welcome, introduction of the demonstrator, and boom, the show goes on. Most people don't come to hear SIG announcements or listen to the user-group president pontificate.



The Demonstrator

My theory is that the best demonstrator is the software's programmer. This is because the programmer knows where to find the tweaky features that user-group members want to see, and the programmer is usually unaware of the marketing lies he or she is supposed to tell.

The second-best demonstrator is the product manager of the software. The third-best is a technical-support person, and the fourth-best is a field sales rep. You'd think that a salesperson would be higher—and I have seen some excellent demos by salespeople—but by and large, they are hired a week before the meeting, know only the Windows version, and are full of sushi.

Demonstrators should not be allowed to show Persuasion or PowerPoint slides

or overheads, no matter how dynamic they think their presentations are. I've seen demonstrators spend 30 minutes explaining the "strategic" and "visionary" qualities of their products, and then have no time for a demo. This is major-league bozosity—like becoming the CEO of a company that's being investigated by the Securities and Exchange Commission and then claiming you didn't know about the investigation.

If the demonstrator asks any of these questions before the meeting, it means big trouble: (1) Is there a copy of SoftPC on the machine? (2) Do I have to bring my own VGA card? (3) Can you provide a laser pointer for my presentation?

On the other hand, if the demonstrator asks any of these three questions, you're in for a great demo: (1) Do you mind if I compile a new version while people are sitting down? (2) Will you have some Jolt Cola for me? (3) Can you make sure no one from my company's marketing department is in the meeting?

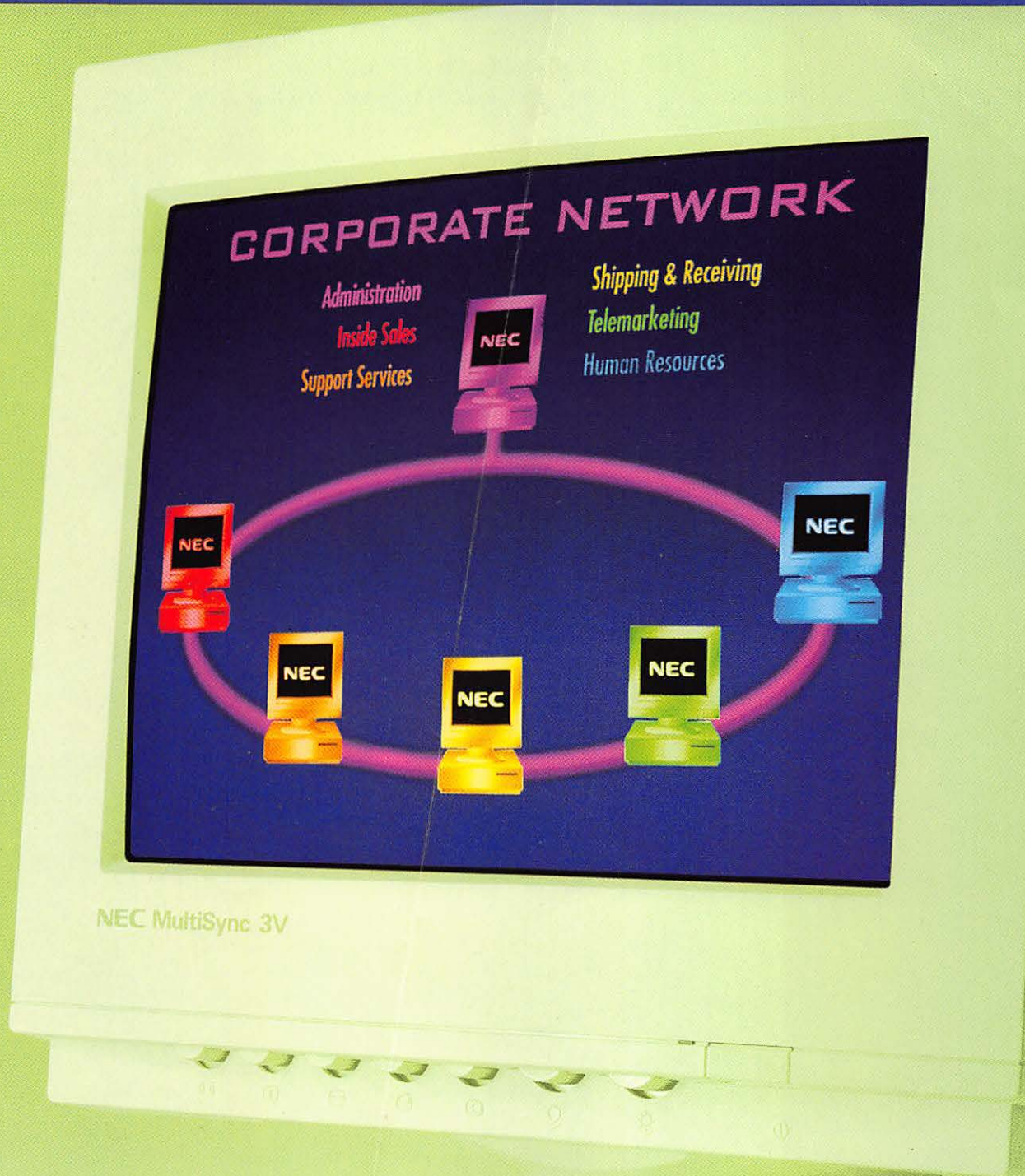
My Favorite User-Group Story

I'll end with my favorite user-group meeting story. At the Seattle Downtown Business User Group (dBug) I explained that I once got a ride in an F-15 fighter jet because an air force general read that in 1986 I had jokingly offered members of the Pentagon MUG a Macintosh II prototype for a ride in an F-16. (Today a Macintosh II will get you a ride in a used Jeep.)

Someone in the audience (a Microsoft employee, probably) interpreted this to mean I had bribed this general with a Macintosh, and the person instigated an investigation by the inspector general of the air force. I've never been so insulted in my life. You know me better than that: if I bribed someone, I wouldn't announce it at a user-group meeting. **m**

GUY KAWASAKI's views are his own and only sporadically represent those of *Macworld*. His latest book is *Hindsights* (Beyond Words Publishing, 1994). He has investments in Bit Jugglers, Global Village Communication, Bookmaker Corporation, and others. He can be reached at Kawasaki@radiomail.net.

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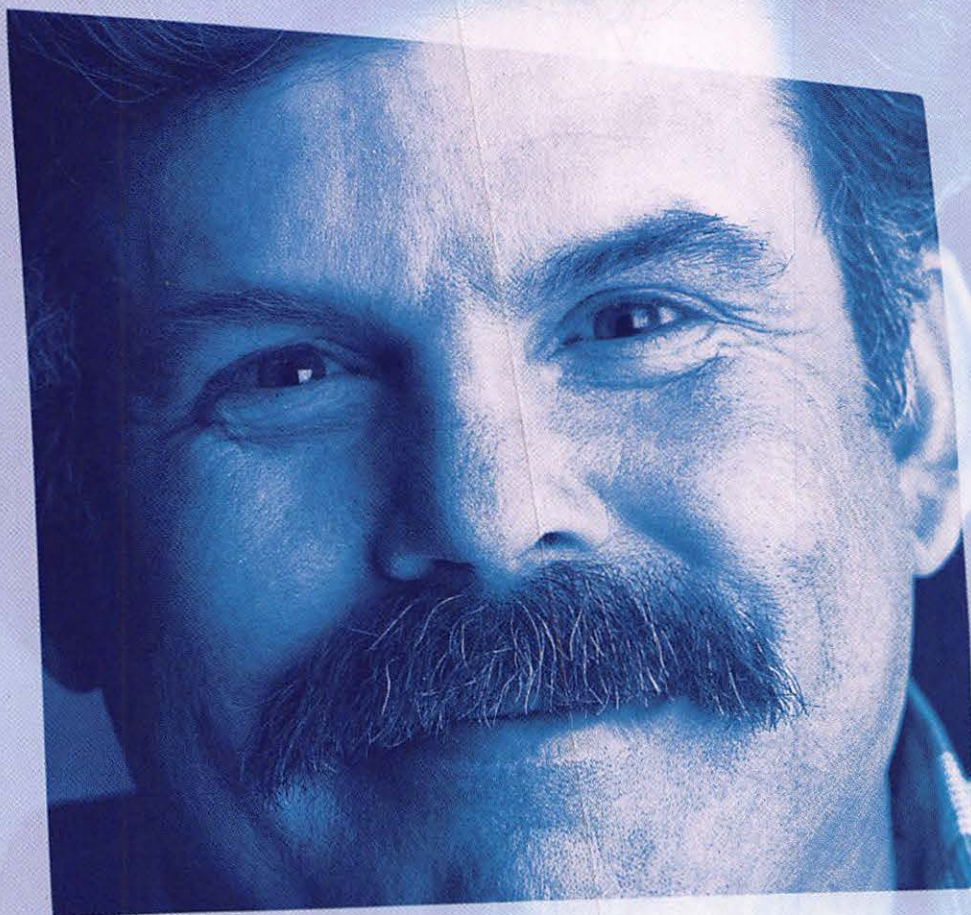


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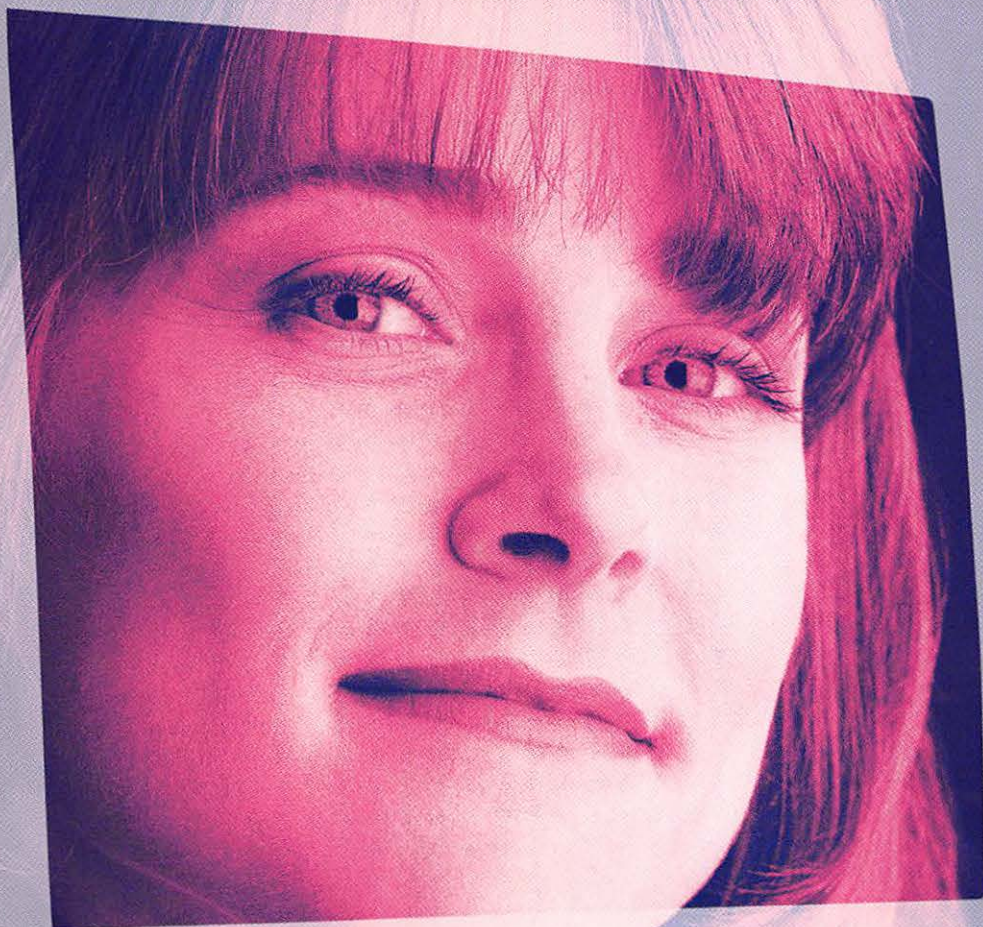
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